THE FOUNDRY

VOL. 2. DETROIT, MICH., JULY, 1893. No. 11.

A CAST IRON VAULT.

Fire, Burglar and Mob Proof.

WHILE much has been said and written during the past few years concerning the rapidly increased use of steel for purposes for which cast iron was formerly considered all sufficient, it is interesting to note that the march of progress has brought with it a much greater degree of knowledge concerning cast iron and its uses, brought about probably by a better understanding of its elements and its nature together with improved methods of using it. In nothing that has recently been brought to our notice is all this more true than the Burglar and Mob Proof Vault, which has been manufactured in this city for some years past by Hough & Harper, of Pittsburgh, at the Griffin Car Wheel Works. These vaults, as will be readily understood from the illustrations which we present herewith, are made of hugh blocks of cast iron ordinarily about 12 inches thick, 16 inches high and 34 inches long. This rule is violated, however, in the case of the blocks used in the corners over and surrounding doors.

The method of manufacture consists simply in having a complete drawing made of the size and shape of the vault, number of pieces, shape of pieces, etc., and then molding each separate piece and making it the exact size required. The molds being all made simply from skeleton patterns or frames of various sizes. In the first place the face or bottom side of the mold consists of a large flat chill, upon which is laid the frame of desired size and shape. Around this is laid the dry sand core which forms the sides being made to form grooves and dove tails on the blocks when cast After getting the cores set properly, great care being taken to have them all exactly true and square, the frame is withdrawn and top covered with

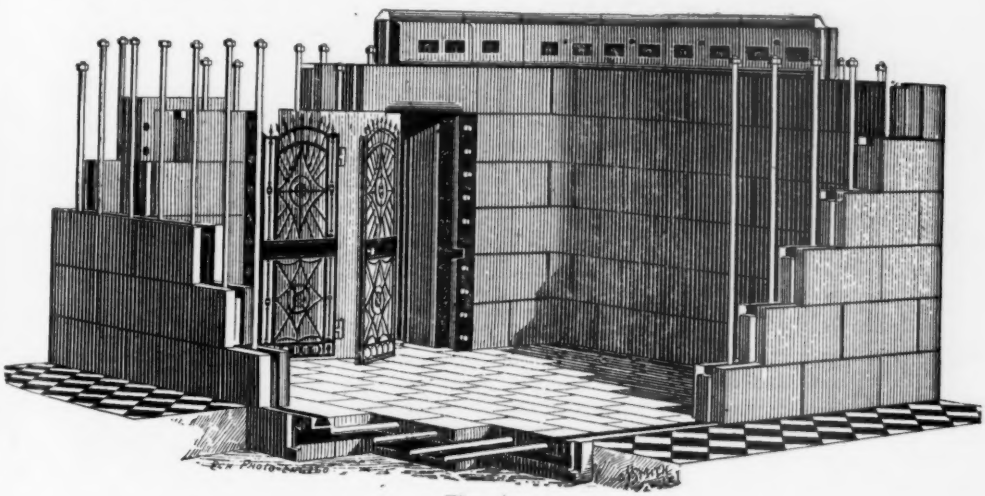


Fig. 1.

greens and cope. The chill or bottom side of the mold forms the outside when built on to the vault, the edges, as shown in the engraving, containing the dove-tails which serve to bind it together and they together with the side, with the exception of the outer edges, are consequently grey iron.

As the chief item of interest in this matter to foundrymen is the casting itself and its method of manufacture we would say that the iron used consists largely, if not entirely, of the best cold blast charcoal iron mixed with the finer grades of Salisbury. The blocks when cast are fastened to a bed plate which travels backward and forward under a rapidly revolving emery wheel, and are over the doorway being 36 inches in thickness and weighing 9,500 pounds.

The doors which are all cast in one piece have a uniform thickness of 12 inches and weigh 12,000 pounds each. The vault doors run on rollers and do not turn on hinges, there being a recess provided behind each one upon which they are run back into space provided for them. It will be noticed in Figure 1 that the door nearest the reader is back in its place, and on the top of it can be seen two of the holes provided for receiving the locking bolts, while one of the day gates are open and the other shut. The vault where the door slides in is three feet thick, the thickness of the metal on each side of the 12 inch

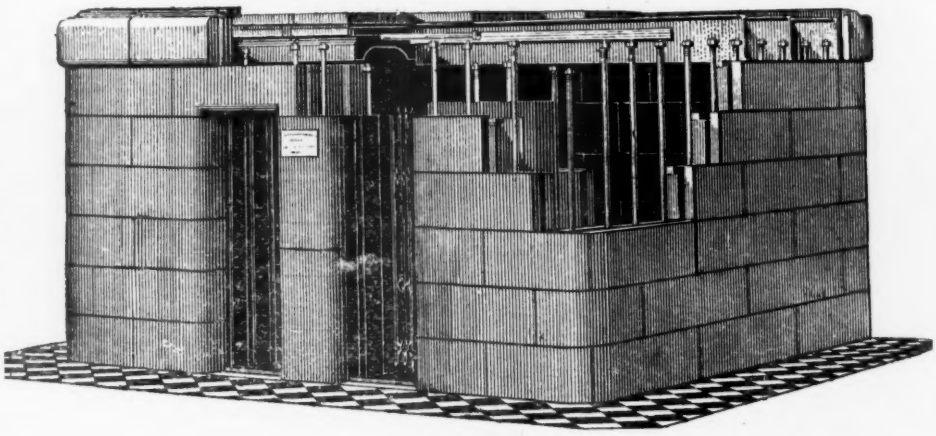


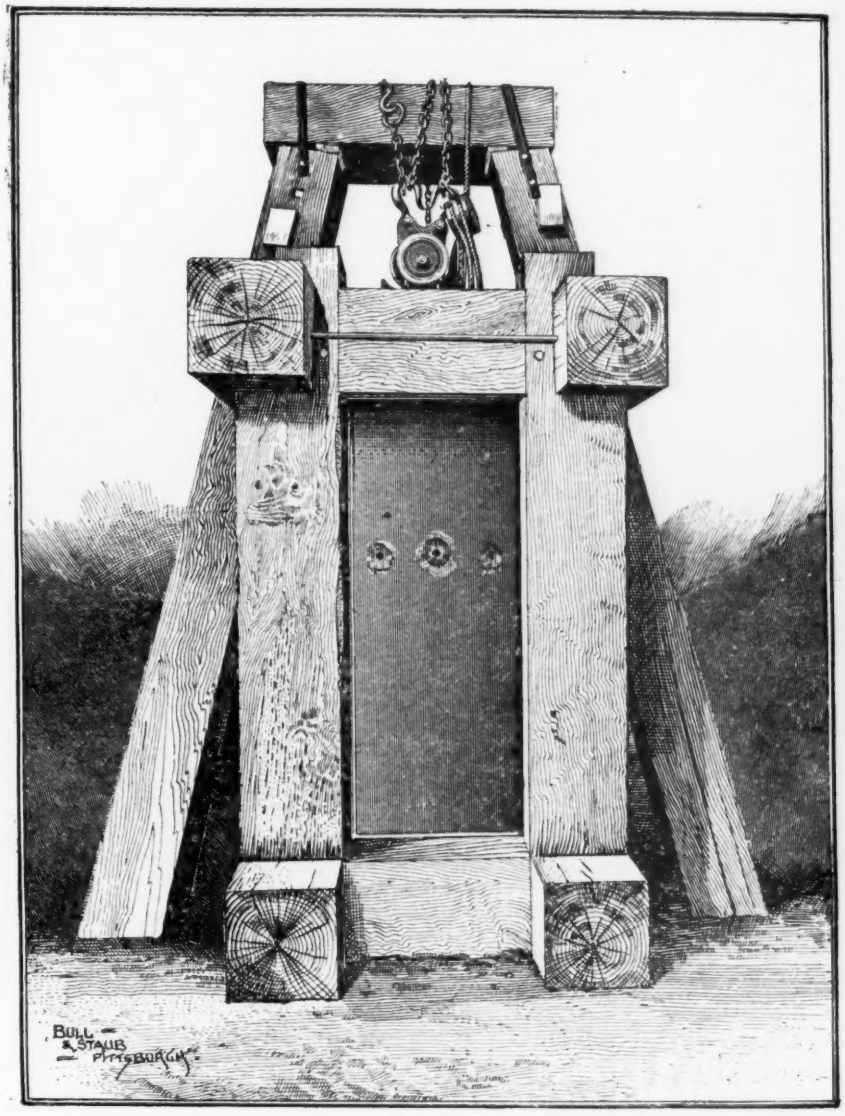
Fig. 2.

by this means ground perfectly true. They are fastened together, as will be seen, in the first place, by the groove and dove-tail before mentioned and afterwards with the $2\frac{1}{4}$ steel tension bolts, which are plainly seen, recesses being left in the corner block both above and behind all the way around for the nuts which can be thus tightened up. Before this is done, however, long thin parallel wedges are driven into what space there is between the grooves and blocks, and the balance of the space filled with a rust joint cement which welds the whole into one solid, massive, structure impervious alike to the drill of the burglar, or the gun powder or dynamite of a determined mob. The blocks weigh from 1,700 to 3,500 pounds, the block space. The locking device is set in the foundation blocks, the door being moved transversely across the recess by a combination of gearing built right in the foundation, the gearing being operated and secured by a locking device set in front of the vault under the tiling and operated by a detachable socket wrench. The vault is locked on the inside by a series of steel blots running into a groove at back edge of the door, and which is operated by an automatic bolt throwing device and governed by a three movement time lock.

Fig. 2 shows a perspective view of the outside of the vault, with a portion of the front corners, side and roof removed to show construction. Two doors are provided to prevent a "lockout," in case

through any accident anything should happen to one of the doors. So much for the construction.

The particular merit of this vault lies in the fact that it is claimed by the manufacturers that it is practically indestructible; it is said they can be neither mined, drilled, wedged nor blown open because there are no angles to be blown away, no orifices for the insertion of an explosive and it is impossible to drill the door or any part of the vault in the time a burglar would have even were all the resources of a machine shop at the disposal of the driller, while the method of construction and the nature of the materials renders futile all efforts to remove a block by piecemeal. The force necessary to effect an entrance would demolish it, and the force required to demolish it must destroy the building and surrounding buildings, thus burying the assailants in the ruins. The following



from the "Detroit Free Press" will give some idea of the severe tests to which one of the doors was subjected without in the slightest degree effecting it, illustrations in figure three showing it after it had had several charges of dynamite and the holes drilled for that purpose: "For nearly a week workmen had been steadily engaged in boring holes into the door, which is 12 inches thick and for experimental purposes was set in a white oak frame-work of timbers 16x16 inches. Three holes an inch and a half in diameter and three inches, three-and-one-half and five and one-half inches, respectively, in depth, had, after a week's continuous labor been bored. Mr. Hough wanted to see how much dynamite it would take to blow the thing up, but fortunately enough of the explosive was not taken down. The first test was made about twenty minutes after two. Mr. Dunbar weighed out one and one-half ounces of dynamite and filled the smallest hole. Then a cartridge was imbedded and wires connected with the battery, which was placed at a distance of about 150 feet, were attached. It was touched off and a loud report which startled the neighborhood followed. Everybody who was present to witness the test ran to see if they could find a piece of the door left which they could take as a souvenir. What was their surprise to find the door intact. A fracture of about an inch was made, but that was all. Now any reasonable person can see how perfectly burglar-proof the vaults made by this firm are. In the first place no two burglars could bore a hole three inches by one and one-quarter inches in twenty-four hours. Then admitting they had and their work was not dicovered, the explosion of seven ounces of dynamite in a bank building would undoubtedly make a louder report than that of yesterday, which was in the open air. Mr. Hough was not satisfied with the first trial, so Mr. Dunbar proceeded to fill the largest hole, which was five-and one-half inches deep. It took two ounces of dynamite to fill this opening. This surely would break a hole in the door. A loud report. A rush to the spot to see what was left. The door stood there as peacefully as if nothing had happened. A fracture somewhat larger than the first, and perhaps about one-and one-fourth inches, was made. The door stood the test remarkably. As a last resort, the three holes were filled, requiring nearly seven ounces of dynamite. The interested witnesses took the precaution to get away farther than before. Surely the seven ounces would blow the door all over Wayne County, but it didn't. The concussion shook the ground and buildings in the vicinity, but the door stood at its post like a Roman sentinel. It had withstood a severe test. It seems hardly probable that there are any persons who, after witnessing the operation yesterday, or reading of it, could think that it would be possible for a burglar, no matter how skillful, to effect an entrance."

It would seem from the care taken in the erection of these vaults that every precaution has been observed to make them as nearly absolutely perfect as possible, the main features of course being the iron itself and the care taken in the selection, mixture, molding and casting.

The blocks which enter into and make up the construction of the vaults are manufactured by the Griffin Car Wheel Co., of Detroit, Mich., and are cast from their regular car-wheel mixture. Any mixture of iron suitable for the casting of first-class chilled car-wheels, must be a superior cast iron, and the above named Company, with the advantage of a fully equipped chemical laboratory in connection with their foundry, is enabled to obtain a particularly strong and hard metal, between which and the ordinary soft foundry cast iron there is as much difference as between ordinary cast iron and wrought iron, not only in its property of chilling, but it possesses nearly double the strength and tenacity. Moreover it is subjected to a series of daily tests and strength, hardness and chemical analysis whereby the greatest uniformity in every respect is assured. Special attention is given to these analysis and the mixture entering into the blocks is, to a large extent, regulated by them, where-

by the objectionable and weakening features of cast iron (very high percentages of phosphorus and sulphur) are reduced to a minimum, and the other elements so proportioned as to give the hardest possible exterior of chilled iron, and at the same time the toughest possible interior of grey iron.

In short the iron being, as noted above the same exactly as their carwheels are cast from receive the closest atttention, withstands the severest tests and is second to none.

Figure 1 shows a rear view of one of these vaults, a portion of the back, front, side, floor and roof removed to show general construction and interior. The long steel tension bolts 2¼ inches in diameter in view, passing vertically through the walls and horizontally through the floor. The rectangular blocks in floor exposed, showing groove connection, the adjacent blocks having corresponding tongues, the dove-tail joints uniting the faces of the blocks at right angles to the tongue and groove.

Figure 2 shows a perspective view with a portion of the front, cover, side and roof removed to show construction, as seen from outside.

Figure 3, being a view of the vault door after the test described above had been made, and 10½ ounces of dynamite having been exploded in the door.

THE WALKER GEAR LIST.

A Unique Book.

WE have it on high authority, that "to the making of books there is no end." Above one-half the books printed, should be burnt by the public hangman. But here is a book worth preserving. It is not the cover which attracts; for it is strongly bound in plain black cloth with gold lettering; neither is it the excellent printing, or high class engraving; but it is the 312 pages of specialized data on power transmitting machinery and general Engineering notes, which constrains us to maintain, without fear of contradiction, that this gear list (10th edition) issued by the Walker Manufacturing Co., is the finest thing of the kind ever published. We have often admired the freedom with which strangers, are allowed to inspect the magnificent plant of the famous Company; but the perfect sang froid, with which they here give to the world, almost priceless data on power transmission, together with original designs, heralds a new departure in the Industrial Ethics of this country. To many a superintendent, many a draughtsman, many a foreman, the information contained in this handbook, will be simply invaluable. Even the numbering of gear patterns has been brought down to an exact science, and there is not a foundry superintendent in the States, but would be the better for a study of the few paragraphs printed on page 239. Then on page 240, there is Mr. John Walker's well-known essay on his system of gearing, in which he demonstrates the superiority of his own patented method. That the Walker system has been a success, is proved by 51 pages of testimonials from firms of high repute ; but perhaps the chief value of this work to the general reader, will be, the 58 pages of engineering notes at the end of the book. Never before has there appeared such a concise, yet exhaustive statement of the essential data, and formula of power transmission by gears and pulleys; by belt, cable and rope drives, including a brief philosophical explanation of the law, which differentiates *rolling,* from *sliding* friction. The copiously illustrated essay at the end of the book, entitled "Transmission of power by Ropes," would alone be the making of any ordinary work on rope driving; but added to the special features indicated, and taken together with the fact, that the text is illustrated throughout, with confine examples of the engraver's art; we conclude as we began, by saying, that this book is worth preserving, and no responsible factory or foundry engineer's library is complete without the tenth edition of the Walker Manufacturing Co's gear list. We note that this is Vol. I., and that the subsequent volumes are:

Vol. II., price list of pulleys, hangers, couplings, pedestals, shafting, etc., with engineering notes.

Vol. III., miscellaneous:—cable ma-

chinery, hydraulic machinery, foundry plant equipment, etc.

We eagerly await the subsequent volumes. In the meantime, we heartily recommend Vol. I, which we perceive is sold to other than manufacturers, at $1.00 each.

THE MOLDERS ART AT THE FAIR.

FOUNDRYMEN visiting the World's Fair should be careful to see those things which may be interesting, as showing what is being done or has been done by others in the same line.

In the Manufacturer's Building we especially noticed some very fine specimens of the molder's art in the French department. There were several cast iron figures in the shape of small statues, etc., unfinished and left just as they came from the mold, with "gates" "fins," and "partings" etc., plainly showing. They were particularly remarkable for their fine order and perfection of detail for iron castings. Nearly in the same exhibit we saw some beautiful work in bronze and brass, mainly in the way of house hardware, which showed that our French friends were fully abreast of the times in this respect.

W. Rose of Philadelphia, shows in a handsome case a nice line of molders' tools, well finished and of neat designs. In the Goverment Building there is shown a neat model of the Roman process of casting cannon, which we referred to in a previous number as being the method specified by the U. S. Government. The Michigan Stove Co's exhibit includes what is vouched for as being the oldest stove in America, thus showing, by contrast, the advances made in stove manufacture in the last two hundred years; as might be expected, this company's exhibit is superb. The stove in question is one that was made in France and placed in the first established convent in America, located at Quebec, 1693, and is at present owned by Chas. F. Guenther of Chicago, and is valued at $10,000.00.

CONCERNING FOUNDRY COKE.

MR. EDITOR,—The address of Mr. Jonas Wister before the Foundrymen's Association of Philadelphia, delivered April 5th, 1893, is very interesting reading, and doubtless there is much scientific truth in his description of coke making, but to follow his suggestion of using a twenty-four hour coke in preference to a seventy-two hour coke for melting foundry iron in a cupola furnace is very misleading, and the more apt to cause mischief in it being part of an address in which so many good things are so well put. I had hoped to see in your June number of THE FOUNDRY some response to this part of Mr. Wister's address, but finding none I write to say that a practical founder would not be very observing who would not immediately detect the difference in favor of the long time coke. In all foundry practice nothing pays better than using the hardest and most perfect coke for melting foundry iron; for it melts larger quantities in less time, and leaves the cupola in better condition. It keeps its body until spent, keeping the charge open so that the blast can penetrate, producing the more perfect combustion throughout.

An imperfect coke used in a cupola will and does disintegrate, solidifying the charge, clogs up the tuyeres, and makes an abundance of trouble and annoyance. The comparison between a blast furnace and a cupola furnace does not, I think, hold good. The blast furnace carries as many pounds pressure as the cupola does in ounces, and this, with the difference in construction, will in some way account for the fact that blast furnaces use successfully a low grade of coke that would produce wretched results in a cupola.

Then, again, in Mr. Wister's comparison between coke and anthracite coal, the inference is that anthracite coal is too hard to melt iron successfully, whereas the the fact is that hardest anthracite is only fit for cupola work. It *melts* iron about equally well with good coke, but the melted iron is not so good, because the iron in the melting absorbs considerable sulphur from theanthracite coal, whereas the sulphur is eliminated from the bituminous coal in the process of coking.

Yours truly,

WM. Y. CRUIKSHANK.

Lebanon, Pa.

THE FOUNDRY

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

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THE FOUNDRY is issued promptly on the *tenth of each* month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in *molding, melting, mixing of* metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the *Editor of this Journal* by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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HOW IT LOOKS TO A MAN UP A TREE.

EVERY man who has read the papers, and even those who have not, has been made aware that for sixty days or so there has been something seriously wrong with our financial system.

Not with the government—that is O K ; and it would not have been different had some other party been in power—not with this country. It is the same now as when Columbus first saw it, only immensely bettered by development. Illuminated by the same sun, moon and stars, watered by the same cooling rains, and contains still untold riches under its surface. The trouble is not with the banks. They are our servants more than our masters, and act largely in response to public feeling in times like these. But the trouble lies elsewhere, and although THE FOUNDRY has read much bearing on the subject, and seen the views of statesmen, polititions, financiers, manufacturers, editors, etc., *ad libitum*, we are compelled to fall back upon a theory of our own, because all others vary, and some of them we believe to be purposely obtuse, with a view of mystifying rather than enlightening and simplifying.

In the first place let us avoid all deep, scientific problems in considering a subject in which the humblest are interested as factors, as proven by the fact that a crowd of ignorant foreigners, who may hardly be able to understand a word of English, can suddenly get "scary" and precipitate a run on some bank and cause its suspension, although it may be perfectly solvent.

What has the balance of trade, the Sherman act, the balance in the United States treasury, Free Silver Coinage or the policy of European financiers got to do with such people? Absolutely nothing. Such talk is all rot, yet over seventy-five per cent. of the present "panicky" feeling and its twin brother Dull Times, is due wholly and entirely to the presence of a general feeling of groundless distrust in the minds of people of all classes, who would resent as an insult being compared to a crowd of ignorant Poles, while their actions show them to be, in the light of their superior intelligence and educational advantages, infinitely worse. THE FOUNDRY knows of an absolute fact of instances where people of moderate means have withdrawn their savings from the banks and locked them up or hid them at home. In one in-

stance in this city one poor benighted individual followed that plan, and in a fire that burned nearly the whole block lost his all, even the money that had been provided for such emergencies by much stinting and saving; while another man in the same block refused to renew his insurance a short time before in one of America's best insurance compaies for fear "it might fail," and he, like his nieghbor, lost all.

But it is not alone the poorer classes that have been making fools of themselves. Men of large means and supposed sagacity have been known to draw their money from banks where it was drawing interest, and lock it up in safe deposit vaults.

Now, it does not require any extent of forethought or business knowledge to see where such a policy, if all were to do it, would shortly land us. And the chances are ten to one that those who are most instrumental in precipitating such a crisis are the ones that will suffer the most in the long run.

Let us, by way of lllustrating how this works, just suppose a case. Let us take a city or community of, say, 200,000 inhabitants, with money divided up among its citizens to the extent of perhaps $50,000,000—some having large sums and some small, and some not any—but that amount representing the capital of the commnnity. In ordinary times it will be found that such a sum as a basis of exchange is scant, and can hardly be kept circulating quick enough to enable all to pay their debts; or, in case A owes B $10, B owes C $10, and C owes A $10, it will be more or less a hard matter for A to get the money to pay B, in order that B may pay C and C pay A, because there is not enough money to go around, even supposing all were perfectly solvent.

Just here is where the great trouble is. People become careless; too many unsafe business ventures are indulged in; parties get trusted without any reasonable prospect of repaying; too many risks are taken; too much reliance is placed on borrowed capital, and what is generally known as inflation of credits takes place all along the line. Suddenly some large concern goes under and some bank loses; the banks become more catious and refuse to to extend some other concerns' notes; they, too, are forced to the wall, perhaps causing the bank itself to temporarily, at least, close its doors. Then a general feeling of insecurity sets in. Depositors begin to withdraw their money from the banks, and they in turn are compelled to refuse all loans, no matter how good the securety. This works great hardship. Manufacturing establishments, failing to borrow what they need, curtail their forces or temporarily shut down, and banks, acting only in self-defense, or for the protection of their depositors, whose agents they really are, call in all outstanding loans, in order that depositors may be paid, if need be; and, as a result of a general lack of confidence, there is wide-spread poverty and destitution.

Probably of the aforementioned $50,000,000, $45,000,000 are deposited in the banks, either in savings or commercial deposits, the depositors, or a large part of them, loose their heads, or good sense, whichever it is, and withdraw $20,000,000, leaving only about half of the original amount to carry on $45,000,000 worth of business. Of course it suddenly becomes almost impossible to either collect or pay debts, and all new enteprises are suddenly dropped. Building operations having ceased, men are thrown out of employment and misery reigns. Money can be made to circulate only just about so fast anyway, and diminishing the amount in circulation 40 per cent. not only eventually reduces the business transactions by nearly that amount, and renders very timid, if not almost unavailable, the balance.

As to the remedy—restore public confidence. These people in New York and Washington who think they own the country, do not. They own only a little share, and when the men who own the money get over their scare, business will be better, and not before. We can be thankful we are escaping so easily. The worst is now past. It may take some time to react, but business is on the mend. The number of failures—the most infallible sign—are decreasing, and conservatism is apparent in all directions.

The repeal of the Sherman act—if it is repealed—will help, but principally because the people are easily humbugged. They got scared easily, and perhaps as easily may be persuaded to "play ball" again. In the meantime, do not get excited; keep cool. Do not blame the banks; they are the bulwarks of the country, and if they had done as their critics would wish, we would be much worse off.

Especial attention is invited to the advertisement of The Ohio Molding Sand Company, which appears elsewhere. The company makes a specialty of supplying foundries direct in all parts of the country with sand of any grade, and suitable for all classes of work.

TO THE PUBLIC OF CANADA.

STRETCHING along the northern border of the United States, with its sixty-five millions of people, lies Canada, with its four or five millions; and while we in this country have been complaining of an industrial depression of late, it is as nothing compared to the financial desolation that has been bearing down so heavily for several years back upon our neighbors to the north.

We, in this country, are apt at times to complain of the corruption to be found in high places among our public servants, but in this particular also we have been outstripped and left far in the rear by the foul scandals which have recently been exposed to the world as having an abiding place among some of the leading members of both political parties in Canada.

Latterly a new party has come to the front over there called "McCarthyites," after their leader, one of whose ambitions is to place Canada upon a more independent footing and make it a country, instead of having it tied and bound hand and foot to the furthering of England's interests thousands of miles away. It is quite likely that in the coming elections this new party will show its power; and it is almost as certain that while they may accomplish something in some directions they are not likely to have conferred upon them any wonderful amount of authority. This is more than likely to result in making them still more radical, in which case we may expect to hear of a party being formed with the sole object of founding the Republic of Canada.

The country is weighted to the ground with debt, its government is a most extravagant one—as evidence the fact that it costs as much to sustain the titled figure-head who is appointed by the Queen at the expense of Canadian taxpayers, and who is called its Governor-General, as it does the President of the United States—and in addition to that, if the Canadian news papers are to be believed, the country is steadily decreasing in population, and there is no longer any reason to doubt that there are as many Canadians in this country as there are there, and the number is increasing every hour.

If by any means Canada could become independent and establish an honest, economical government of its own on a different plan, and enter into amicable relations between itself and the United States, millions of dollars of American capital would be poured into that country to develop its resources, and thousands of its young men, whose leaving there for this side has been sapping its vitality, would return to make it a country they could be proud of—honored among the nations of the earth. A change of great magnitude is eminent, however, and must be made, as business there is dead, absolutely dead; and the present situation cannot continue. Annexation meets with little favor. Canadians naturally do not like to sink their individuality, and will want a government of their own. What more natural than a republic.

A BUSINESS PROPOSITION.

AS will be seen by the advertisements on pages 21 and 57, we are giving both old and new subscribers to THE FOUNDRY something phenomenal in the way of liberal inducements to aid us to increase our circulation. We want a *bona fida* subscription list of 10,000, and want it right away.

In August we will be twelve months old, and are desirous of being known as the most successful trade paper of our age, and if you desire to help us you will be well recompensed for what you do.

WESTERN FOUNDRYMEN'S ASSOCIATION.

THE first regular monthly meeting of the Western Foundrymen's Association was held Wednesday evening, June 12, at 225 Dearborn street, Chicago, Ill., in the office of the Detroit Foundry Equipment Company. In the absence of the President and vice-President, C. A. Sercombe, of Schwab & Sercombe, of Milwaukee, Wis., was elected Chairman, pro. tem.

The treasurer's report was read, accepted and ordered to be placed on file. The following names were proposed for membership:

Wm. Ferguson, of Frazer & Chalmers, W. A. Jenkins, T. A. Wigham, of Greniner Economical Cupola Co, Chicago Foundry Supply Company, Chicago Scale & Axle Company, Chicago, Ill.; J. S. Hibbs, of Paxson & Company, Phi'adelphia, Pa.; H. F. Frohman, of Obermayer & Company, Cincinnati, O.; Chas. W. Sisson, of George F. Hull & Company, Louisville, Ky., all of whom were unanimously elected.

The secretary read a letter from Mr. C. A. Plamondon containing his resignation from the association on account of sickness in his family, which necessitates his absence in Chicago for some time to come.

The Association, after expressing its regrets that Mr. Plamondon had been compelled to resign, accepted his resignation and deferred the election of a president until the next regular meeting.

The secretary read the following: "Mr. A. W. Walburn, of Walburn-Swenson Company, makes the suggestion that all members of the Association shall place on file with the secretary a statement of their capacity, the kind of castings they make, the number of men they employ, etc. Should this be done, when one of the members receives an order he cannot fill, he could refer the intending buyer to the secretary, who would send notices to the various members who make the kind of work required that they may bid on the job."

The suggestion was discussed freely by the members present, and it was moved and carried that it be referred to the Executive Committee.

A communication was read from Ernest W. Cooke, of Armour Institute, which is as follows:

ARMOUR INLTITUTE,
33D ST. AND ARMOUR AVE., CHICAGO.
F. W. GUNSALUS, President.

CHICAGO, June 6, 1893.

Mr. C. A. Plamondon, President Western Foundrymen's Association, Chicago.

DEAR SIR:—Having had our attention called to the notice in the Chicago *Journal of Commerce* of June 1st, of the organization of the Western Foundrymen's Association for the advancement of foundry practice, we wish to inform you that Armour Institute has under consideration the establishment of a testing laboratory to be equipped with the most recent and accurate machinery for testing, chemically and mechanically, all kinds of material used by the engineering world. Part of our equipment for such a laboratory would be the following: tensile, transverse and torsional testers; cement and wire testers; a micrometer of $\frac{1}{1000000}$ of an inch accuracy; gravity and microscopic machines; and a complete mechanical room furnished with the most recent and perfect apparatus for analysis. We should be pleased, therefore, to confer with your association with a view to an arrangement whereby Armour Institute might furnish reports from its laboratory, daily or weekly, to the association or its members. In the event of such an arrangement we would wish the members to avail themselves of the opportunity to be present during any tests that they might desire to see made.

Our various technical departments are now being fitted up preparatory to the opening of the Institute in September, and we hereby extend an invitation to your association to inspect, at a stated time convenient to yourselves, the apparatus which is being installed.

The Department of Mechanical Engineering is for the benefit of all young men who wish to become pracical engineers. The full engineering courses are four years in length, the course in mechanical engineering requiring six hours daily for the theoretical and practical work. A summary of the work in this department will show the practical character of the instruction. All classes of engines will be designed and constructed up to 100 H. P., single, compound, triple expansion, quadruple expansion, double compound, and all kinds of machinery will be thoroughly investigated and their merits and defects analyzed, All known makers of boilers and as many engines as possible will be practically tested and operated in the engineering laboratory during the fourth year.

It is the aim of the Armour Institute to produce men thoroughly familiar with the construction and operation of the general forms of machinery, and who, when given a machine to design or a problem to solve, will execute their work promptly and accurately.

The theory that is required for mechanical engineering will be thoroughly treated; but the purpose of the Institute throughout will be to prepare its students to handle practical problems in a masterly way.

On behalf of the Technical College of Armour Institute, I remain,

Very truly yours,

ERNEST WM. COOKE,

Director of the Department of Mechanical Engineering.

After the discussion of the letter as to the advantages to be obtained by accepting the invitation of Mr. Cooke, it was moved and carried that a special committee be appointed by the chair to confer with Armour Institute and report at the next regular meeting.

The following gentlemen were appointed to act on said committee: Messrs. Gardner, Whiting and Wigham.

The Secretary also read a letter from Mr. Howard Evans, secretary of the Philadelphia Foundrymen's Association, congratulating the Chicago foundrymen upon having become organized, and suggested that steps be taken to form a National Association, which was placed on file.

The following paper prepared by Mr. Thomas D. West, of Sharpsville, Pa., was then read in Mr. West's absence, he unavoidably having been prevented from being present:

THE UNEXPECTED IN THE FOUNDRY.

BY THOMAS D. WEST.

In a sense, the whole day's routine of a foundry manager may be said to be a battle with emergencies or the unexpected; for, from the moment he steps into the shop until he leaves, the unexpected is constantly arising to keep him perplexed, and at his wit's ends to devise ways and means to overcome difficulties and get rid of obstacles. Of course, every tradesman thinks his trade the worst business a-going, and for one I do not desire to persuade him differently; for to have to labor for a living at anything is acknowledged to be generally disliked, and follows by more truth than poetry the comments of the foreman who, when asked for a job by a man who said he was willing to work, replied: "No, my man, you are laboring under a delusion; it is not your willingness but necessity that compels you to work." And, from my experience in the foundry, I feel safe in saying, it is not love for labor that holds the founder in the harness. I wish to be charitable to all trades, but I do feel justified in saying the founder's lot is one of the worst; and have oft heard the heads of manufacturing plants embracing a dozen trades intimate the foundry manager's lot in life was the most perplexing and arduous of any trade he knows of.

Whether such be true or not foundry managers know they are annoyed and worried so often that life feels little worth living for, and mostly caused by the differant emergencies constantly ensueing in his daily labors, and to lessen the burdens of such we can be of much assistance to each other by a recital of our trials and the way they were overcome. I believe there is not a founder but has had some exceptional experience with the unexpected, which if related, would be sure to benefit some of our benighted tradesmen, and for their monthly meetings there is no member but that could cite some experience with the unexpected, and hence assist in making the meeting a success.

As a starter for myself I will offer for discussion a little of the unexpected in cupola practice, and will condense the matter as much as practicable, for with these class meeting chats, as they might be called, I think it well they be limited so as to give all members a chance and have ample time left for discussion and interchange of ideas and experience by which the greatest benefit should be derived from such a meeting of practical men. My little chat upon the cupola I will present in the form of a query for discussion, hoping others will follow with their ideas and experience, stating what they would advise in the case of a bunged up cupola at bottom drop. The following is the course practiced by the writer:

MAKING A HOLE THROUGH A "BUNGED CUPOLA."

Often through carelessness or ignorant management and through use of poor fuel and undesirable irons, and also running a cupola beyond its capacity, it will become "bunged up" so as to stop melting, and when the bottom is dropped the cupola may be left holding half its charging high in fuel and iron, and if same cannot be got to drop by poking

at the tuyeres, the tendency is for air which could not get through the bunged tuyeres to get up after the bottom drops through the porous center and cause combustion of fuel sufficient to bring on melting of the iron for a while, the dropping of which tends to form a cake or bridge iron, fuel and slag mixed, which can so completely bung up a coupola so as to cause a shut down for a day to clean the cupola out.

To prevent such occurring there must be active work from the moment it is seen that the cupola will not drop. In my practice we first try to see what can be accomplished by poking the tuyeres with iron and steel bars, sometimes using a sledge on same. If in five minutes after bottom drop, the same course is found to not be effective, water is then thrown into the cupola to stop as soon as possible all melting of the iron and cool off the cupola. This is, of course, a little distructive to the brick lining, and is used only as a last resort, but with care in throwing it in, little need be splashed against the lining. A few pails full of water soon stops all melting, and cools the top of the hanging stock sufficient to admit of men inserting a long, heavy bar from the charging door, into the center of the bunged stock, and by pounding upon top of the bar with a heavy sledge, the chances are very favorable of driving same through the stock and thereby get a hole started, which if followed up or enlarged by other bars, or pulling up same by means of a light chain or rope tied to it, a hole large enough to admit a man is soon made. This, when accomplished, is all that is necessary to further labor for, until the cupola is cold enough for a man to enter and complete the work. By the above practice I have seen some very badly "bunged up" cupolas cleaned without shutting down for a day, retarding the next day's heat or making that night of torture and worry for the foundry management.

Mr. Penton thought the article was written to promote discussion, and this would be facilitated by having it printed. Mr. Ferguson thought it was the best kind of a case to show a man's individuality, although it could not be properly classed as an emergency case. In his experience it would occur mostly in the small cupolas—those of smaller diameter. He said that in days gone by it might have been called an emergency case, but to-day foundrymen are not on the lookout for it.

Mr. Wigham held that it would be impossible to say what would be done to remedy such an accident uless the cause was known. It might be caused by various incidents.

Mr. Vrooman agreed with Mr. Wigham.

Mr. Sercombe suggested that it would be a good idea to print the article in the trade papers, and it would then be open for discussion.

A paper written by Mr. William Ferguson on the "Development of the Foundry in America in the Past Thirty Years," was read:

DEVELOPMENT OF THE FOUNDRY IN AMERICA THE PAST THIRTY YEARS.

This is too broad a subject for anyone to attempt to cover with much satisfaction in one short paper, therefore we will not deal with details to any great extent.

One often hears the remark that there has been less advancement in the foundry than any of the departments of engineering. While judging from the same standpoint as the other departments are measured from, viz: "Special Machinery" this may be true, but from a purely mechanical standpoint the facts in the case show that the foundry has developed as rapid and as thoroughly as the other departments, and has met all requirements put upon it, and while doing this it is surprising to think how well it has met these requirements in the face of such opposition as it has had to contend with, coming from those who should be most interested in its success. Is it not an acknowledged fact that the foundry has been the most neglected department in the majority of engineering plants in this country? And it is only of very recent years that manufacturers have began to realize that this department was deserving of some attention, and for this change much credit is due to those who, having

the knowledge and ability to do so, spared no pains in putting their experience and knowledge before the world in the shape of books and articles in mechanical papers bearing on the subject of foundry practice. These writings have not only helped to educate the molder in his business, but have set manufacturers to thinking that the foundry required some of their attention, and was not altogether the miserable and dirty place they supposed it was.

And truly it must be said that the standing of the molder and his business 30 years ago was not an enjoyable one, and along with this the general impression prevailed that it was a business to be taken up by those only below the average in intellect and not very bright. As an illustration of this I remember an incident that occurred about 30 years ago. A young man just from the farm applied for a position to learn the machinist's trade, and his uncle who was manager, after looking the young man over, expressed himself that he did not believe he would make a machinist, "as he did not look overly bright," but that he might do well enough to make a molder; so the young man was put in the foundry, and to his credit, it must be said, made a decided success.

With the rapid development of this country after the late war came the growth and development of the iron business, and each succeeding year found the manufacturer enlarging his plant to meet the requirements. In those days it was unusual for foundries to cast daily. Some of the largest plants were satisfied with three heats per week, and each heat perhaps would not exceed 3 to 4 tons. Coke, at this time, was just being introduced as a substitute for Lehigh coal to melt with, and there was not the varied amount of different brands of pig iron, or of as good quality as we have at this present time.

And while there were good molders in those days they were not taxed to quality and quantity as they are to-day, "caused by keen competition," and the good molder of those days was almost sure to be a privileged (as well as a boozey) character, and was quite likely to go on a spree just as he knew his services were about to be required on some especial job. While this is not altogether wiped-out it is fast going, and it is rarely we see such cases now. We can not speak of the foundry without making mention of the molder, therefore, you will pardon me for identifying him with the progress of the foundry. Along with the enlarging of plants came the development of the foundry and the requirements of the molder were taxed accordingly. Small plants were forced to take large contracts, far beyond their capacity to fill them, and in such cases the energy and ability of the foundryman were called upon to meet these requirements, and with varied degrees of success, until said contracts were complete. The foundryman with a 30" cupola would be called upon to make a 4 to 5 ton casting, with possibly a 3 ton crane to handle it. If he would ask for a larger cupola or stronger crane he would be told that was out of the question; we had not figured in this extra expense while taking the contract, and we must now make it with such appliances as we have. Then came the anxiety of the foundryman—planning and working, with nothing to do this job—but he finally succeeds in getting what he considers a good, safe mold, ready to be filled. The cupola is got ready with special care, and charged so as to do its best possible melting, for final success now depends on this part of the business; but, when everything possible has been done, we then can see it is going to be too much for the small cupola to do. No one but a foundryman who has been there can tell the mental strain that takes place with all this cost of molding and melting to be finally lost, simply for lack of proper tools to do the required work. Still, in these cases the loss was usually charged to the foundryman not understanding his business, when the fact is, as I have stated, chargable to lack of proper facilities.

In most cases this same thing had to be repeated more than once before the parties interested would conclude to in-

crease the facilities, and which they were most always sure to do, only to meet the present requirements, and as a result they would in a short time again find themselves in the same condition as before. Such has been the history of developement in the foundry, and most men who have been engaged in this business for any length of time, know they have paid well for their learning in this way. It has been noticeable also that where the facilities were about equal to the requirements the foundry was usually as free from loss as other departments, and by this admission we have arrived at a point where we must admit that to get good results, and work a foundry with the greatest economy, it must be done with proper equipment. Manufacturers are each year becoming more alive to the real cause of bad work and excessive cost, and as a result are spending more time and money to equip thir foundries, but still there is plenty of room for improvements. In former years it was the pride of the manufacturer in showing visitors through his plant, to take them through the machine and pattern shops, showing everything in detail, but when they came to the foundry would pass it by as though it was not part of their institution. Not so with the modern foundry, with its electric and hydraulic cranes, molding machines and patent cupolas; it proves to be as interesting as the other departments, and there is a correspondingly brighter future ahead for the foundry and the molder, who in the past has been looked upon to much as a necessary evil, and each year adds greater proof that brains are not only needed, but are used to a greater extent in this part of engineering than most men are free to admit, and the day is not far distant when the trade of the foundry will have the rank and standing in the mechanical world it is so justly entitled to.

WILLIAM FERGUSON,
Supt. Foundry,
Frazer & Chalmers,
Chicago, Ill.

A discussion followed, in which several members took part. Mr. Penton said "more had been done in the way of improving iron foundries and securing improved appliances in the last three or four years than had been done in any previous ten years. I can recall a large number of foundries containing these improvements." Among others he named Wm. Sellers & Co., Philadelphia; Farrel Foundry & Machine Company, Ansonia, Conn.; Walker Mfg. Co., Cleveland, O.; Frazer & Chalmers, Chicago; Lake Erie Engineering Co., Buffalo; Riverside Iron Works, Detroit. Mr. Wigham thought a better equipped foundry than Frazer & Chalmers' of Chicago, could not be found. After many others had taken part in the discussion a vote of thanks was extended Messrs. West and Ferguson, for kindly furnishing material for the evening's entertainment.

It was moved and carried, that the secretary call a meeting of the executive committee at four o'olock on the day of the next regular meeting.

Mr. Penton reported having had some correspondence with Mr. R. A. Hadfield, of the Hadfield Steel Foundry Company, Sheffield, England, who is to visit this city in August, and suggested if possible, that he be requested to be present, and address this association during its August meeting.

The meeting adjourned until the third Wednesday in July.

THOMAS F. GRIFFIN.

AMONG the list of those who have rendered the American foundry world illustrious service and brought credit and honor both to themselves, their family and the community in which they reside, no name is worthy of a higher nich in the pedestal of fame than that of Thomas F. Griffin, of Detroit, Mich. The lessons taught by a study of Mr. Griffin's life are such that we might all profit by them and they illustrate once again what energy coupled with a good character, a determination to succeed, may accomplish for the honorably ambitious man.

Mr. Griffin started life with nothing, and his position in the foundry world to-day is owing entirely to his own efforts, and the possession of virtues which are at all times a valuable capital.

Born in Limerick, Ireland, December 18, 1826, he is consequently in his sixty-seventh year, though to see him at any of the establishments with which he is connected, hustling about in his sprightly energetic way he would strike the ordinary observer with being 20 years younger than he really is.

Left an orphan between nine and ten years of age, with no immediate relatives, his success in life must be regarded as really phenomenal. He early secured employment in a hardware store, but not relishing the treatment he received there, he determined to run away and strike out for himself.

With this in view, and with no earthly possessions whatever, and although a lad of tender years he walked the entire distance to Dublin, 96 miles away, and worked his way to Liverpool, where a distant relative resided, but finding this kind-hearted individual seemed determined to send him back, he made his way to the Liverpool docks and boarded a vessel, determined to go—somewhere—anywhere, he cared not where, whether to China, Africa, or the South Sea Islands. In this case the vessel was bound for Quebec and the captain gave him employment which secured his passage, but the captain being determined to carry him back, he made his escape from the vessel just as she was on the point of returning.

THOMAS F. GRIFFIN.

He landed at Quebec and worked his way to Rochester, N. Y. Here he was first employed in a flour mill, afterwards

working at other things, but finally, in 1843, when but 17 years old, he entered on a four year apprenticeship in the foundry of Traver & Benedict. After completing this he was judged sufficietly competent to take charge of the foundry which was a large one, holding the position for over 26 years.

Later, in 1873, he removed to Detroit, and under a five year contract commenced the manufacture of all the car wheels needed for the Michigan Car Company. Leaving this, he erected a foundry of his own in its present location, commencing with thirty chills and nine men, and turning out but 18 wheels a day, and no other castings of any kind, the works have steadily increased until they occupy about 5 acres, with a foundry over 700 feet long and 65 feet wide, besides other buildings, and with a capacity of 250 wheels per day and 40 tons of other castings, employing at times as high as 300 men.

In addition to this Mr. Griffin is interested in the Griffin Wheel & Foundry Company, Chicago, and the Ajax Forge Company, the latter making a variety of railroad work, such as frogs, crossing switches, link pins, etc., and which is under the management of his son, Mr. Thomas A. Griffin. Another one known as The New York Car Wheel Works. Buffalo, N. Y., is under the management of a younger son, Mr. P. H. Griffin, this latter having a capacity of 75,000 wheels a year and 7,500 tons of other castings.

The St. Thomas Car Wheel Company, St. Thomas, Ont., is another, and is under the management of Mr. P. H. Griffin. As will be seen by the foregoing, Mr. Griffin has risen from one of the humblest positions possible to that of a manufacturer whose interests extend into almost every state in the Union, and whose example could be worthily followed by many of the younger workers at the business. He is still a firm believer in the fact that there exists plenty of opportunities for young men of the right kind, and his experience, wide acquaintance and reading renders him peculiarly qualified to give an opinion.

Subscribe for THE FOUNDRY.

J. S. McCormick Company, of Pittsburgh, Pa., operate a large foundry facing and supply business right in the heart of the iron trade. They evidently know a good thing when they see it, and in this they apparently resemble many readers of THE FOUNDRY, among whom they must have some customers and friends, judging from the following extract from a letter we have recently received from them dated July 3rd: "We have nothing new to mention, but that business as a general thing is dull, in spite of this depression we are having a good share of trade—in fact we think that we are getting a large share. Your paper, we are glad to say, has done us a great deal of good. At first we were afraid to advertise in it, as we thought this means of reaching the trade was not the best. We have, however discovered our mistake, much to our benefit. We hope that the paper is meeting with the patronage that it ought, as no one who is interested in the foundry business can afford to do without it."

The Donald Frazer Mfg. Co., of Milwaukee, Wis,, are enlarging and increasing their specialty business and are now in a position to finish a complete line of supplies for foundry and patternshop use; they are also at work getting out a new catalogue that ought to be in every foundry office.

The *Manufacturer's Record* gives the number of "machine shops and foundries," started in the south during April, May and June as 20, against 25 during the preceding three months.

The Indianapolis Foundry Company, Indianapolis, Ind., have their new buildings under roof, and are putting in a stock of raw material preparatory to commencing operations.

Henry Todt, proprietor of the foundry and machine shop at Lapeer, Mich., is dead. He fell on a sidewalk and sustained fatal injuries.

McCarthy & Moore's foundry, at Leadville, Colo., was damaged by fire June 23rd.

THE YOUNGEST MOLDER IN THE COUNTRY.

WE have often wondered who originated the expression, "He does not know enough to pound sand." However as a general rule, it is a safe one to apply to the average man under almost any circumstances, as there is not one man in a hundred who does know how to pound sand, and more over it takes an unusually bright man to become a successful sand pounder.

As an evidence that brightness is required, and to show that old age is not always an essential, we present to our readers this month a portrait of a young man 4 years old who can ram up a flask, roll over, make a parting, ram up a cope, lift it off, finish his mold, cut the gate, close it on, and pour it with any man of his age on the continent.

MASTER CHARLIE METTLER.

His name is Charlie Mettler, son of L. M. Mettler, of Brookfield, Mo. He was born in Adrian, Mich., and removed with his parents to his present residence, where his father operates a small foundry. He is said to be a remarkably precocious and very manly little fellow, who will doubtless develope into a first-class mechanic.

The foundry of Daniel Dow, Grand Forks, Dak., was burned to the ground three weeks ago.

The Kalamazoo Radiator Works foundry, suffered severely by fire June 23rd. Loss about $5,000.

CHROMIUM STEEL IN AMERICA.

THE Steel Foundry at High Bridge, N. J., is very busy making Manganeze Chromium Steel Castings under the patents of Mr. R. A. Hadfield, of Sheffield, England. They are at present making a specialty of car and mine wheels, and judging from the more than enormous strength of wheels thus constituted they can be expected to come into universal use at no distant day. Foundrymen as yet are not generally informed concerning the revolution in this matter that is near at hand, but will appreciate the significance of what we say when we tell them that recently a 2000 pound ball was dropped six times a distance of fifteen feet upon a common mine wheel weighing 70 pounds, 16 in. in diameter and only $\frac{1}{2}$ inch thick in arms and rim, and as a result of this most severe test not a crack was visible in rim or elsewhere, but the wheel was put badly out of shape.

The Addyston Pipe & Steel Co., Newport, K. will build a foundry

The Worst Place.

Bobby—Who made the earth, pop?

Fond parent—God, Bobby.

Bobby—Did he make heaven, too?

Fond parent—Yes, Bobby; he made heaven, too.

Bobby—And hell?

Fond parent—Yes, Bobby.

Bobby (solemnly after a pause)—Pop, did he make Chicago?

PITTSBURG AND VICINITY.

The present dullness in the iron industry is felt no worse in any other place in the country than in this great iron centre. The stagnation of affairs has naturally enough extended to the many foundries in the Pittsburg district, and there is much inactivity among them—an inactivity, it is encouraging to note, however, that has not caused any entire shut-downs, but only a decrease in production, and, in some instances, in the force. But Pittsburg energy and Pittsburg hope are proverbial, and the foundrymen are expecting better times when the summer weather is at an end. There is much foundry work being done at present, though, it must be understood.

Pittsburg foundries have furnished much of the natural iron used in the construction of the World's Fair buildings. The amount is a great deal more than the outside world would imagine.

The Robinson-Rea Manufacturing Company have broken ground for a large foundry building at their plant. Its erection has become necessary by the increase in orders requiring foundry work. The building, which will be 200x143 feet in size, will be fitted up with all modern improvements.

The construction of the new foundry in connection with the great Edgar Thompson Steel Works at Braddock is going on at a highly satisfactory rate. There are now under roof two of the main buildings. The foundry will be of unusual size, and equipped in a thorough manner with the most modern machinery.

The Girard Stove and Foundry Company, of Girard, O., a short distance from here, has been incorporated with a capital of $30,000, by a number of practical business men of that place who will make it a go. The plant has a most complete line of patterns and machinery.

The Wheeling, (W. Va.,) Mold and Foundry Company is a new West Virginia enterprise. The projectors will manufacture and deal in molds, castings, structural work, etc. Charles E. Blue, James B. Moore and Arthur Hubbard are among the incorporators.

The Pittsburg Architectural Iron Works was granted a charter a few weeks ago. The capital stock is $150,000, and some of the best known business men of this vicinity are interested. The incorporators are John A. Butz, G. C. Dellenbach, William Eberhardt, of Allegheny, Pa., William B. Noal, Pittsburg, and H. P. Butz, Uniontown, Pa. They will shortly begin the construction of a large plant after a suitable site is secured.

Plans are being completed for the construction of a large rolling mill by the Mahoning Valley Iron Company, to be erected at Youngstown, O., near hear. The entire structure will be iron, steel and stone, and will be one of the best equipped and most complete mills in the busy Mahoning Valley.

The McConway-Torley Foundry Company at Forty-fifth street are one of the few foundries in Pittsburg that are filled with orders. They are quite busy at present.

Among the new foundries to be established in Ohio in the near future is that of the Wardner, Bushnell and Glessner Company at Springfield. It will be most complete in every respect, and will be 80x500 feet in size. That district is one of the best for foundry work in the country.

John I. Williams, the veteran superintendent of the Brown-Bonnell Iron Company at Youngstown, O., intends to retire from the iron business in a short time, and will lead a retired life on a farm. Mr. Williams is one of the best known iron men in not only the Pittsburg district but in the entire country, and was connected with many large firms. He engaged in the business in Pittsburg many years ago, and was connected with James Bennett and Graff, Bennett & Co. for a long time, being appointed general manager at a large salary when the plant here became the property of Henry C. Ayer. After the failure of Mr. Ayer, Mr. Williams retained his position under Receiver Brown, and continued with the concern when it was recently organized as the Brown-Bonnell Iron Company.

Russell & Co., of Massillon, O., manufacturers of agricultural machinery, have laid off 200 employees lately on account of an over-stock of goods.

The organization of a new company to erect a manufactory for the manufacture of stoves on a large scale is being talked of by a number of Pittsburgh capitalists. Should the deal be a go, a location will be secured in one of the manufacturing suburbs which are springing up about Pittsburg.

A number of foreign foundrymen have been inspecting Pittsburg's varied manufactures during the past few weeks. They stopped off on their way to the World's Fair.

Business is booming with the Marshall Foundry Company, who have one of the largest plants in this part of the country. The dull times do not seem to be affecting their trade, and they have quite a number of orders ahead.

There are few Pittsburg foundries using natural gas at present for fuel. Several years ago, when it was plentiful in the vicinity of Pittsburg, it was used by many of the firms when practicable, but the decrease in supply, the expense, and the fact that the suppliers will not permit its use in many instances for manufacturing purposes, preferring to keep the supply for domestic consumption, presents the reason for the change.

The foundry of John Miller, at Youngstown, O., is rushed with work. It has recently received an order for 2 18-inch rolls for the Mahoning Valley Iron Company, and an order for 1 20-inch chill roll for the Reeves Iron Company, of Canal Dover, O. The Miller foundry is well equipped for rapid and thorough work.

The Leechburg foundry and Machine Company, located at Leechburg, a few miles up the Allegheny river, has just received an order from the Whitaker Iron Company, of Wheeling, W. Va., for a Mesta patent pickling machine for pickling plates up to 130 inches long, and of any width. Another order is from Marshall Bros. & Co., of Philadelphia, for 2 Mesta trimming shears, for which the Leechburg Company received a patent in April last. The Company is busy in its chill and sound roll departments, and has recently received many orders from new customers. It is stated they are contemplating making some improvements in their plant.

T. MORGAN SILVEY.

Foster Brothers' new Stove Foundry, Lebanon, Pa., will soon be in running order.

The Treat Mfg. Co., Hanibal, Mo., are making some improvements in their foundry buildings.

The International Foundry and Malleable Casting Company will remove to Selma, Ind., four miles east of Muncie.

There is some prospect of A. L. Ide & Son moving their large machinery shop and foundry from Springfield to Champaign, Ill.

NOTICE.

All advertisements under this head given two insertions free of charge when placed therein by subscribers. All others will be charged 2 cents per word for each insertion.

WANTED—Five good, sober heavy machine molders—steady work. Stevenson & Co. Wellsville, O.

A MOLDER with 15 years experience, capable of running a shop, wishes to take an active interest in some machine foundry. References exchanged. Address M. M. care "The Foundry."

A WELL-KNOWN FOUNDRYMAN is open for an engagement as foreman or superintendent of iron foundry. Don't write unless you have a first-class position to offer. Addres N. E., care of THE FOUNDRY.

AN EXPERIENCED and energetic iron molder who understands something about steel molding, fully capable of taking charge of a foundry, would like a position. Can furnish the best of references. Address J. B. W., this office.

AN ENERGETIC YOUNG MAN of steady habits, with large experience on light bench work, rammer and machine practice, accustomed also to floor work up to 5-ton castings, and to handling men, desires a position as superintendent or foreman of a foundry. Address SUPT., this office.

TRAVELING salesman, energetic and reliable men, who reach the foundry trade, to push as a side line, a first-class article. Exclusive territory and liberal commissions given In replying please state territory you cover and goods you handle. Address, G. H. Gardner, 31 Vincent St. Cleveland, O.

Advertisements inserted under this head for 25 cents a line each insertion.

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country, small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

WANTED—A practical foundryman with about $5,000 to take interest in one of the best manufacturing businesses in the West. Address K, 1537 Williams Street Denver, Colo.

FOUNDRY FOR SALE—I offer for sale the Aurora Foundry. New brick building, 40x60 feet, and everything in good shape. Price, $3,000; one-half cash, balance in one and two years. Address W. C. WENTZ, Aurora, Neb.

WANTED—A man to take charge of a new and very modern foundry—all green sand work. Six floor men and fourteen bench men. A man willing to work himself, good prospects for the right man. Address "Foundry," this office.

FOR SALE—Entire Foundry Outfit, at Huntington, Ind, consisting of 1 40 H. P. Boiler, flasks, column, stairway and bracket patterns; ladles, holding from 150 to 300 lbs. metal, together with a hundred other articles that is necessary to equip a first class foundry. We prefer to lump the entire lot to one party; will come near *giving the stuff away*; we are compelled to remove it from the building. Address E. K. CLAYTON & SON, Huntington, Ind.

FOR SALE.—Second hand machinery and appliances: One 26 and 1 30 degree Cupola, latest design; core oven, with carriage 4x20, crane, brass furnace, tumbling barrel. A large supply of flasks, ladles, facings, tools, etc.; an extensive lide of patterns for architectural, engine, jobbing work, etc. One 12 H. P. engine and boiler; 1 12-foot bed engine lathe, with all attachments; 1 upright drill, 30 degrees (new); lot of blacksmith's tools, etc.; 1 wood-turning lathe, 12-foot bed; all iron jig saw (new); cut-off saw, wood-working tools, etc, together with a good stock of plumbers' tools and mill supplies—all in first class condition, and can be bought for one-fourth its cost. Apply at once; have to quit business owing to bad health. Address CHAS. GILBERT & SON, Albany, Mo.

A FEW SUGGESTIONS.

I SAW in your June issue a discussion on blackings and dressings, my experience has been varied, for light work I use a mixture of charcoal and soapstone, in proportion of 3 of charcoal to 1 of soapstone, and find that it gives excellent results. For medium heavy work I use carbon, soapstone and E. I. plumbago in equal parts. It is splendid for heavy work. The E. I. plumbago should be used with judgment. The great fault is in facing sand, for a heavy pipe the facing sand for the cope should be weak, the dressing will accomplish the desired result, coal dust for facing sand should not be too fine for heavy or medium work, great care must be taken in the use of coal dust, I find that the famous Pittsburgh district coal is preferred. There is a very important matter overlooked in foundries generally, that is in the mixing core blacking or wash. The proper method is to work your dry blacking or dressing into a stiff batter. Knead it thoroughly and then thin it gradually to the proper consistency. Core dressing can be used improperly, and it will create blisters on pipe, it depends on the brand you use, if a strong brand, weaken it with carbon and in proper proportion. It will give excellent results. PRACTICAL.

A press dispatch from Wilkesbarre, Pa., states that all the brass used on the Jersey Division of the Central road has heretofore been molded at Manchester, N. J., and that used on the L. and S. Division has been put through the same process at Ashley. Recently orders came to the latter place to build additional furnaces and make other preparations necessary to do the molding for both divisions. About 1,400 pounds of brass is molded into shape for use each day, and hereafter the molders will do the work according to the piece system.

The Wrought Iron Bridge Co. of Canton, Ohio, contemplate the adoption of an improved roofing consisting of thin sheet iron with tarred felt on both sides, which it is claimed successfully resists the actions of gases and prevents the condention of moisture on the under side, which often causes much annoyance by dripping, especially in foundries.

CORRECTION.—The item in the June issue of THE FOUNDRY to the effect that McMarrtin & Sons intended removing their foundry from Dayton to Sidney, Ohio, was premature. They propose to remain in Dayton.

FOUNDING AND MATALLURGY.

As Practiced in the Early Part of the Last Century.

PART SECOND.

Containing some general observations concerning the proper regulating of the fire.

IT is not alone necessary that we know the most efficient composition, and how to proportion the quantities according to the condition of the fire, but it is most essential that we know how to regulate the duration and intensity of the heat, and prevent the flame from finding any entrance into the creusets or similar articles in which the iron may be enclosed.

The fire in the furnace should only act gradually on the iron and composition, and should only be communicated to both through the sides of the creusets that contain them. Should any cracks or breaks occur in the sides, it is useless to urge the fire as the bars or those parts we wish to turn into steel, will always remain iron if exposed to the heat of the fire direct, they only become steel when surrounded by or receiving their heat from the composition, and when the heat strikes the latter direct, it changes its nature and destroys it, by reducing it first to ashes and then to a hard mass half vitrified, incapable of supplying the oily and saline parts so necessary to convert the iron into steel.

The creusets should be placed in such a way that the operator can watch them carefully, and see from time to time if any of these cracks appear, as they are easily distinguished by the blue flame which never fails to appear, the whole length of the crack and is caused by the burning of the soot and charcoal. When a break occurs, if large, and the operation not very far advanced, it is better to stop entirely and extinguish the fire and withdraw the bars rather than continue a work which would only cause loss of time as well as of the composition and part of the iron, but if they are narrow and extend but a part of the width or heighth of the creuset and the operation is nearly completed, it is better to continue as it would take time to consume the composition near the crack, and by that time the operation would be completed and the rest of the composition uninjured. Of course it is inecessary that the creusets be well closed, and the cover sealed if possible by some earth which is inclined to melt, because not only does the

composition near the top burn when the cover does not fit well, but a sublimation of the salts takes place, sometimes so considerable that all the openings of the cover or of the arched roof of the furnace, are whitened by the salts that have been carried off. I found no taste but that of sea salt in them, the composition being of course weakened by all the salts, that it has lost in this way and although it loses an equal amount in oily materials, it is not as perceptible.

One thing, however, is astonishing, viz: As to the length of time the composition will retain its strength when the creuset is air tight, no matter how violently the fire has been pushed for several days, the layers between those of the iron remain about the same as they would appear after a few hours fire, retaining their original color and bulk but reduced about one-half in weight, being, however, fully as inflammable, showing that the oily parts remained about the same. This fact, singular as it may appear, being only in accordance with accepted physical laws. As a fire can only consume those parts, it can carry off, while here it cannot carry off the parts of our materials. Lighted charcoal well covered with ashes, is a long time on fire before being entirely burnt out, while the walls of a creuset are quite another thing, and a still greater obstacle to evaporation, and the heat within the creuset would not remain were it not that it is kept constantly alive by the fire outside.

The creuset should not be filled within an inch or an inch and a half of the top according to the size of creuset, because, when the heat is first applied, the material inside is likely to swell, and unless it finds space to occupy, is apt to force it open.

The first glance at a bar when it has been withdrawn from a creuset shows if it has been near or entirely exposed to the air.

When the work of closing has been well done and the composition surrounding a bar has not been burnt, the color is a dark brown while the fracture shows a slate color with little white brilliant spots. If the composition surrounding the bar has been reduced to ashes, then the bar itself will be covered with a scale easily detached by blows of a hammer, but like the composition, the iron will itself be burnt.

Next to the ingredients and mixture of the composition, the most important matter in making steel is the degree and duration of the heat. If it does not last long enough the operation is not complete, and it can easily be detected when forging and tempering the iron as the presence of a little iron in the steel is immediately apparent. Then again, steel that has not been in the fire long enough, is deficient in other ways. I sometimes worked steel that I had made and evidently with the greatest success, it took when tempered one of the nicest of grains, yet when fashioned into chisels to cut iron cold it would go to pieces at the first blow.

I did not know what to make of this for it occurred with iron that had previously worked most successfully, and with the same composition. Somtimes I attributed this to air that had found an entrance into the creuset, and sometimes to other causes that had no bearing on the matter whatever.

My iron having become steel to the centre, I never suspected that the continuance of the fire was needed to cause the sulphur and the salts to so act on it that it would have the necessary hardness. When, however, I had made this last reflection, I put my soft steel in the fire with the necessary composition a second time, and when taken out I found them as hard as I could wish, and though the experiment was afterwards often repeated its success was always the same. Consequently, if we have steet too weak, the remedy is to put it back again.

Nevertheless, we should be most careful not to apply the remedy too strongly, for if steel which has not sustained enough fire is not sufficiently hard, that which has been in the fire too long sins in other ways. It is too difficult to work, it cannot be welded, it warps and cracks, besides being the reverse of smooth. When writing on tempering we will have occasion to recite some further singular facts concerning this steel, but shall say here as we have said already concerning other circumstances, viz: that the space, which separates too much from too little fire is not an indivisible one, but the interval is sufficiently great to be easily taken advantage of.

The fire will have to be continued a fifth, or a sixth, more than the ordinary time to spoil steel, and I would not even recommend that in steel factories, the fire should be of equal duration, but rather have it vary in order that the steel might be of different grades suitable for various kinds of work. The workmen using it can then select that most suitable for any particular purpose.

ANOTHER ADVERTISER HEARD FROM.

Byram & Company
IRON WORKS.

415 to 443 Guoin Street
66 to 84 Wight Street

Detroit, Mich. April 15/93

The Foundry Pub. Co.
Detroit Mich

Gentlemen It may interest you to learn that we are receiving enquiries for our Colliau Cupola and Foundry Ladle which we can trace directly to our Ad" in your journal.

We are much pleased indeed that such a publication has started, and as our own business has been on the increase we must credit some to our display in "the Foundry"

We believe your final success is assured

Yours Sincerely
Byram & Co.

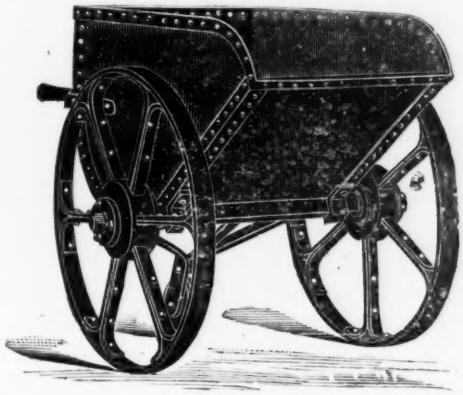
Messrs. Byram & Company are among the very oldest Cupola and Foundry Equipment Construction Companies in America.

They have advertised in different ways with varying results but think THE FOUNDRY the equal of any they have yet tried. They have been with us from the first number and while their letter is conservatively written, it is to the point.

A CHARGING BARROW FOR FOUNDRY USE.

IMPROVEMENT is the order of the age, and bearing this in mind the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, have placed on the market a steel charging barrow that it seems to us should find a place in almost every foundry in America as for the purposes of wheeling sand, carrying small castings, cinders, etc., it should be simply invaluable, while for cupola charging and carrying fuel to the scaffold it should save its cost in short order.

The box or bowl of this barrow is made of the best steel plate and ¼ inch steel angles, all firmly riveted together, as represented in cut. The sides are of No. 10 gauge steel, and the bottom of barrow, from back to mouth, of No. 6 gauge. An extra plate, or "false bottom" of No. 10 gauge steel, 12x24 inches, is firmly riveted in the bottom to "break the fall" of heavy materials when



thrown into barrow, which makes it very durable at a point where the ordinary charging barrows too quickly wear out as a general rule.

The mouth of barrow is re-enforced by an extra piece of steel plate, and a solid band of iron is riveted entirely around the top edges of barrow.

The box, angles, axle and bearing rollers, are all of the best steel possible to procure for such purposes. The axle is two-inch square steel.

The wheels have wrought iron riveted double spokes (1½x½ inch), with hub cast around spokes. The roller bearing is stationary inside the hub, so the wheel may be easily removed any time desired. Diameter of wheel is 34 inches, with tire 2½ inches in width by ¾-inch thick.

The drag wheel is 6¼ inches in diameter and attached to the bottom and sides of the barrow by heavy three-pronged wrought iron hanger.

The handles are 12 inches, but can be made any length desired, if so stated in ordering the barrows.

The Improved Anti-Friction (or Roller) Bearing, which never needs oil, makes this the easiest running barrow ever made, and one man can handle it, when loaded to its fullest capacity with any substance not heavier than iron ore, without great labor. It is easy to push, easy to dump, and no second man is needed to load, push or dump it.

THE FOUNDRYMENS ASSOCIATION

THE twenty-fifth meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, Wednesday evening, June 7th, 1893.

Mr. Francis Schumann the president, occupied the chair.

The minutes of the last meeting were read and adopted.

The following were present:

Mr. W. R. Brinton, J. Morton Poole Co., Wilmington, Del.; B. H. Ennis, J. Morton Poole Co., Wilmington, Del.; J. D. Newbold, R. S. Newbold & Son, Norristown, Pa.; J. Max Bernard, C. B. Houston & Co., Philadelphia; Frank R. Jones, Jerome, Keeley & Co., Philadelphia; J. M. Payne, Rogers, Brown & Warner, Philadelphia, Wm. Dette, Rogers, Brown & Warner, Philadelphia; E. H. Mumford, Worthington Hydraulic Works, Elizabethport, N. J.; Francis Schumann, Tacony Iron & Metal Works, Tacony, Phila.; J. Hy. Pepper, *Iron Age,* Phila; George P. Smyser, E. G. Smyser's Sons, York; P. D. Wanner, Mellert F. & M. Co., Reading, Pa.; Thomas Devlin, Thomas Devlin & Co., Phila.; Mr. J. H. Julien, J. W. Hoffman & Co., Phila.; Geo. N. Cromback, Crown Smelting Co., Chester, Pa.; T. B. Harkins, T. B. Harkins Foundry Co., Bristol, Pa.; J. Thompson, J. Thompson &

Co., Phila., Thomas Glover, Glover Bros. Phila.; John McEwan, W. A. Ellis & Co., Phila.; E. E. Brown, E. E. Brown & Co., Phila.; Guyon Miller, Sec'y, Downington Mfg. Co., Downington, Pa.; Ed. Bureau, Bureau Bros. Philadelphia, H. S. Sparr, Greiner Economical Cupola, Philadelphia, Pa.; Thomas J. Rankin, Abram Cox Stove Co., Philadelphia; P. Kearns, Stuart Peterson Co., Philadelphia; H. P. Pickles, Wilmington Pipe Foundry Co., Delaware; S. G. Flagg, Jr. S. G. Flagg & Co., Phila.; Thomas Hobson, *Iron Age*, Phila.; George C. Davies, Chamberlain, Turney & Baird, Phila.; Chas. T. Holbrook, Juniata Furnace & Foundry Co., Phila.; W. H. Fairlamb, Wilmington, Del., Wm. Wark, Dienelt & Eisenhardt, Phil.; Hy. Ruhland, Hy. Ruyland & Co., Phila.; Alfred Betts, Betts Machine Co., Wilmington, Del.; H. C. Vansant, Morris Tasker & Co., Inc. Phila.; W. S. Messick, Pusey & Jones Co., Wilmington, Del.; J. S. Stirling, Harlan & Hollingsworth Co., Wilmington, Del.; George Mitchell, Mitchell & Sheppard, Phila.; G. T. Marsh, Sup't. S. Baltimore Foundry, Baltimore, Md.; L. B. Whitney, A. Whitney & Sons, Phila.; John S. Wilbraham, Wilbraham Baker Blower Co., Phila.; Milton R. Wike, Jerome, Keeley & Co., Phila.; J. K. Bougher, J. W. Paxson & Co., Phil.; A. B. Paxson, J. W. Paxson & Co., Phila.; Howard Evans, J. W. Paxson & Co., Phila.

The Executive Committee reported that a large number of negroes were employed in foundries, particularly in the south, but are found in a number of shops further north, especially Baltimore, Cincinnati, Philadelphia, where they find employment as moulders, casting cleaners, firemen and laborers.

The financial situation of the country was talked over. Collections are difficult to make occasioned probably by the fact that the banks refuse credit except on gilt edged securities, and are asking for additional collateral for loans which have already been made. This has its effect upon the manufacturers, and is no doubt the cause of the failure of some of our large concerns that have gone into the hands of receivers. It is also noticed that some of the large manfacturing concerns are the slowest pay, the smaller concerns find it convenient to make prompt settlement in order to establish a good name.

It has gone abroad that this association is local in character. It is our wish to remove this impression as it is National in character. Its member are composed of foundrymen and others who are valuable to the association, from all parts of the United States. The information which is presented at our meetings, is recognized as being of much interest to the foundrymen of this country. Its proceedings and discussions are published in most of the prominent trade journals of this country.

The Treasurer reported a balance of $389.91 to June 1st, after all bills are paid.

The following new members were then elected.

The McLagon Foundry Co., F. B. Farnsworth, Treas. New Haven, Conn.; The F. M. Davis Iron Works Co., F. M. Davis, Pres. P. O. Box 2,371 Denver, Col.; The C. S. Swallow Co., P. O. Box 756, Trenton, N. J.; The Crown Smelting Works, Geo. N. Crumback, Pres. Chester, P.; R. S. Newbold & Son, Norristown, Pa.

E. H. Mumford of the Henry R. Worthington Foundry, Elizabethport, N. J., then made some remarks at length on the subject of "Keep's Test for Cast Iron," pamphlets descriptive of the test having been distributed prior to the commencement of the meeting.

He said in introducing the subject of a new system of tests, he wished to state very plainly that neither he nor the company he represented had any interest in the system, other than the common interest he trusted they all felt in the bringing to the notice of their association anything novel that had been found to be of use to foundrymen. He might say, inasmuch as Mr. Keep had been kind enough to couple his name with his in the pamphlet then before the meeting, that in Detroit some years ago, Mr. Keep and himself were neighbors—that is, the foundry with which he was at that time connected

and Mr. Keep's place of business were not far apart, and, having occasion to make a test for certain castings, he investigated Mr. Keep's method, and, becoming interested in it, had resolved that if ever he was so placed as to be dependent upon a system of tests, he would know where to get a good one.

No longer ago than last July, I experienced the need of some guide in the management of our cupolas, and wrote to Mr. Keep, with the result that I secured from him the first set, I believed, of any apparatus sent out. The apparatus described in the pamphlet is more complete than the apparatus I am using, and, I believe, more complete than is recommended for foundry use. In fact, it is a question whether foundries are ready to adopt so elaborate a system as Mr. Keep proposes. While the pamphlet describes the test very completely, with the method of making it, it may be well for me to say a few words regarding it. 1, As to what the demand for any good foundry system of tests may be; 2, what the nature of such a test is; and 3, what results can be obtained from such a system. As to the demand for some kind of foundry tests, however crude, I think there is plenty of evidence that methods, oftimes crude, for testing the strength of cast iron, are used. A bar clamped in a vise, and having a weight hung on the end, is considered good enough by many people, and there are many methods for making tests of shrinkage. I doubt whether the use Mr. Keep puts the chill test to has ever been followed for ascertaining the degree of hardness in castings.

The other day I had a call from a leading chemist who wished to give me an idea how useful chemistry was to the foundry, and, incidentally, how useful he, as a chemist, could make himself to our foundry. The chemist assured me of his belief that the system of tests I am using (Keep's) was very good, but too complicated for everyday use, and that it began at the wrong end. As a chemist, he said, he thought he could regulate the product of a foundry absolutely, and mentioned that, after the product of the cupola had been cast it would be too late to apply a remedy. This statement I was bold enough to deny, as I do not believe I can always predict an absolute result from the analysis. I am using chemistry as a sort of hygiene, and am supplementing it with Keep's test as a means of obtaining a diagnosis of symptoms with good results. The chemist may prescribe a diet, so to speak, but without a method for obtaining physical tests to indicate the results forthcoming, castings may turn out hard and crack, and the trouble not be discovered until the castings had reached the machine shops some weeks after, and too late for remedy. The chemist in this case may be able to suggest a remedy, or, at any rate, explain the trouble. But unless the chemist has some means of making a physical test he has to work entirely in the dark.

For nearly a year it has been my practice to make tests almost daily by the Keep process, and to carefully record such tests in order to keep mixtures uniform, and at the same time keeping constant watch of the daily changes in the results. The time consumed in this way does not exceed three hours a week. If the iron appears to be going wrong, or getting hard, oshrinking too much, I know immer diately what remedy to apply, thanks to the chemist; at this point chemistry counts. The main guide in the mixture for the cupola, as all know, seems to be the silicon, and if too much shrinkage is apparent it is evident that more silicon is required.

On the occasion of a visit to a roundhouse in England I found a practice in vogue of placing a sign on the boiler head denoting that the boiler was empty. I asked the foreman whether he found it a good plan, and it was admitted there was just a chance of a "hostler" at some time finding no sign there and putting in a rousing fire without any water, with disastrous results. The safest is always to try the gauge cocks. So it is with Keep's tests. If there is implicit faith in the competency of the the chemist to control the foundry output, men will place iron in the cupola, neglecting even rough

inspection, and will eventually—it may be weeks later—find everything wrong. But if there are systematic physical tests made it will be found within a day that something is wrong, and there will be time to correct it. I cannot say much as to the nature of Mr. Keep's test that is not explained in the admirable little pamphlet before the meeting, but I, and doubtless all present, find it absolutely necessary to use some system of tests, and I feel that Keep's is superior to any that I know.

I consider it necessary that a man molding test bars should be kept at the work constantly, that the same kind of sand may be used, that the man may "keep his hand in," and that the ladle may be always in the same condition. Keep's test is unusually delicate in its indications, on account of the small size of the bars used.

This fact is illustrated in a letter I have just received from Mr. Keep regarding the effect of the condition of the ladle from which he pours his test bars. Chemistry will avail very little to show what effect a green ladle has on a casting, and I doubt whether a large test bar would show the same differences in iron poured from different ladles. Mr. Keep says that the results are startling. His bars were cast in three sets. One set from a green ladle, newly lined and baked over night; another from a ladle used the day before and cold; a third from a ladle in use for an hour, and therefore both dry and hot. From the green ladle his shrinkage on the ½ inch square bar 12 inches long was 0.155 inch, and the strength 369; from the ladle used the day before and cold, the shrinkage was 0.151 inch, and the strength 386; while from the ladle that was hot, the shrinkage was 0.143 inch, and the strength 335. From my own experience I can quote a case of a casting which, although shown by Keep's test to be not up to the usual standard, yet passed satisfactorily. It was a cylinder casting. Keep's test, which ordinarily gives me from 0.155 to 0.159 inch in the square bars, jumped to 0.185 inch, and the chill obtained by splitting the end of the square bar, as noticed in the bar before the meeting, the chill occurring from the contact of the hot iron with the polished face of the chill, which ordinarily runs about 0.05 inch, jumped to 0.29 inch, or ¼ inch, and the strength, which is generally over 400, dropped down to 352. The results were so startling to me that I did not believe the casting to be good for its purpose. Yet, although it was found hard to bore out, it finally passed inspection.

Here is seen the usefulness of the test. Had there been anything in our regular mixture wrong, as appeared in this singular instance, it could have been at once corrected. The difficulty in this instance lay in the introduction of brass scrap by accident, the analysis of the iron showing copper 0.02 per cent., and there must have been also a good deal of spelter and tin.

The results to be obtained from this method of test, or any other careful method, are more to be looked for in making it possible to keep iron uniform and make a certainty of its being kept so than to bring about startling developments. While the strength of the test bar which is included in Keep's system is interesting, it is not as important as the shrinkage and chill tests. I believe that most designers make strength a verysecondary question. At the same time the investigation of shrinkage leading to cracks in castings is very important.

I believe that it is the absolute routine and accuracy of the Keep test that make it of service and that the shrinkage and chill tests are far more valuable than the tests of strength. I have here a diagram of one of Keep's tests. A bar ½ inch square not only stood a test of 500 pounds, but held it while I stepped to head of machine, and afterward endured a second application. The diagram shows very nicely what the characteristics of the bar are. It is a photograph of the iron itself.

Referring again to Mr. Keep's letter and the tests of the ladles, Mr. Mumford stated that the results as quoted by him should not be taken as final or correct, as they were not yet fully verified. Mr. Keep had stated that the iron was caught from a cupola in one ladle

and divided among the smaller ladles in 15-pound parts. He (the speaker) once made a mistake, or rather his molder did, by dipping his ladle for the test bars from the top of a large ladle, which made a great difference in the iron. As far as chemistry was concerned, the question was, whether it would overcome any variation in skrinkage made on the same day from the same cupola. Asked which test, chemistry or Keep's he would use, supposing one test only could be made or adopted, he said he would use Keep's. Having Keep's test and knowing no chemistry, it would be quite possible to return to "No. 1 Scotch" and correct any bad results from the use of higher numbered brands, and this is what the practical founders would do at the sacrifice of cheaper iron, which is the aim of men using Keep's tests as well as men using chemistry in the foundry to render available. Keep's test was to point out the difficulty. Chemistry could only explain why the difficulty existed. Finding the difficulty, in his opinion chemistry should suggest the means of remedy.

The chairman remarked as to the question of the strength of cast-iron, that it was a secondary question. The irons of to-day were so near to a standard, and the factor of safety used by engineers was so great, that the question the foundrymen had to consider was the procuring of an iron that would work easily, shrink uniformly, would not warp, would have no chilled surfaces, be homogeneous and free from flaws. This was the principal question nowadays. The question of strength was admitted to be there, of course, and in some cases a very high standard of iron was required. The main feature was to determine whether a brand of iron bought was of the necessary quality. Was it free from chill? In casting, would it crack before it was cold or after? In a simple way, at his company's works, they got at the quality by making a test piece 12 inches long, 3 inches wide, ½ inch thick at one end, and feather edge at the other. In casting they could see marked differences. The feather edge showed the chill, and the foundryman drilled holes until he could not penetrate the iron. In the next heat he would find the chill deeper, or shallower, and the length of bar would give the amount of shrinkage. It was a very simple method. Some test pieces showed the chill from feather edge running up 4 to 5 inches, where the iron was 3-16 to ¼ inch, while in other pieces the chill would run only a short way. The test piece also indicated the fluidity of the iron. Of course the question of strength in these tests was lost sight of. The chairman then, in behalf of the association, thanked Mr. Mumford for his address.

The secretary then introduced to the meeting H. S. Sparr of Philadelphia, the general agent of the Greiner Economical Cupola Company, who read an interesting description of the Greiner process, as found in the pamphlet of the company, also extracts from an article which had appeared in the Franklin Institute *Journal*, entitled: "An Investigation of the Construction of Various Kinds of Cupolas for Melting Pig Iron." Supplementing his reading with remarks of his own, Mr. Sparr aroused considerable interest. Some discussion took place upon the subject, during which Mr. Rankin of the Abram Stove Company of Philadelphia stated that the Grenier process was at his company's foundry, and that so far as they were concerned, it was no doubt worth all that it cost them. It had proved a saving to them, but not so much as had been represented to them that evening, by a good deal. They could melt more rapidly than before, and saved some fuel. He believed, however, that the process would be applied in a more efficient manner than adopted in their cupola. There was some fault in its application which would be remedied the next time the cupola was lined. He could recommend the cupola to any one melting from 15 tons upward, and believed it would prove a saving to them of from 8 to 12 per cent.

The hour being late the meeting adjourned and a lunch was served in the roof garden of the club, which was a very acceptable one and was thor-

oughly enjoyed by those present. A number of toasts were offered, and Mr. P. D. Wanner made a very stirling address on the present condition of the foundry trade and the manufacturer in general. In the course of his address, speaking of the cast-iron pipe trade, which he more particularly represented, he said that all the foundries, as far as he could learn, were very busy. The demand for cast-iron pipe for this season, and for the year prospectively, would go away beyond any demand that the country had ever seen heretofore. The demand for cast-iron pipe at the present time was, in his opinion, very great, and for the year it would be simply enormous. He believed he made the statement at a previous meeting that the pipe trade was dependent to a great extent upon the weather, and that the droughts experienced during last year were likely to stimulate the pipe trade. The country had had freshets off and on since 1886, and the freshets this year were very bad. The trouble in many sections was not in the getting of water, but in the getting away from it. This, of course, kept the pipe business back. But the droughts of last year all through the country stimulated the trade to a wonderful degree. Almost every town and available village was at this time being piped and yet in the face of all this, in spite of this enormous demand, the pipe was being supplied at very low prices, unprofitably low, in view of the fact, too, that during the depression of the last four or five years the pipe foundries had run down to a great extent. Repairs were in order and necessary, so that even if a gain was made on the poor pig-iron men, that was all that was made, as far as the cast-iron pipe trade was concerned. Whatever profit there was in the business at this time was simply taken from the pig-iron men. When foundrymen came to make repairs during the year, which they had to do at its close, they would probably be just as poor as in the beginning. Under the existing condition of things he had not much hope for the pig-iron trade. They would remember that he made some predictions during the early part of the year, and some then present probably thought he was wild when he made them, but in his opinion the predictions had been more than verified, and many around him who had heard him make them could now substantiate them. They could only hope that there would be a change and the change could not come any too soon for all. There might be other causes, but in his opinion the present state of things was brought about by overproduction. In the pipe trade, the pig iron trade, the steel-rail trade and a great many other lines the same cause of depression was apparent. Mr Wanner closed his address with some forcible remarks on protection and the silver question.

The interest in this association is growing, its members are increasing and it can be congratulated upon the success which has favored it. In Union there is Strength. The more members the better the results. It is hoped that every member will use his influence to increase our membership.

HOWARD EVANS, Sec'y.

P. J. McNamara, well-known in Indianapolis, Ind., and other parts of the country having traveled for some time representing the Teetor Molding Machine Co. of that city, besides being in charge of the foundry of the Indianapolis Steel Pulley Co. and subsequently foreman of the foundry department of the Premier Steel Works has gone into business for himself, having associated with him, a well-known pattern maker named Lew Koster and R. Pierce, who is one of Indianapolis leading molders.

The title of the firm is McNamara & Koster, and as they have rented a convenient but idle foundry plant, and have a large number of orders already ahead, we predict for them a successful career.

The large foundry of The A. J. Sweeney & Sons Company, which was moved from Wheeling, W. Va., to Harvey, a new manufacturing suburb of Chicago, is now closed, the firm having made an assignment. The American Loan and Trust Company have been appointed to look after the affairs, and is now at work on the books. The liabilities are about $75,000, and assets $225,000. A resumption is soon expected.

THE FOUNDRY

VOL. 2. DETROIT, MICH., AUGUST, 1893. No. 12.

THE FIRST CASTING MADE IN AMERICA.

JUST at this time, when we have within our national borders the greatest Exposition the world has ever seen, containing as it does so much that serves to instruct and edify, besides showing the progress and development that has taken place in the artistic, scientific and mechanical worlds up to the close of the nineteenth century, it may not be amiss for us, especially in America, to turn aside for one moment and take a look at the first specimen of the iron founder's art made in this country.

In one of the galleries of the Mining Building at the fair the first casting made in America in the shape of a small cast-iron kettle is seen suspended from a small hook, inclosed in a neat case, and backed by a tablet giving in a few brief words an outline of its history.

Every one interested in the foundry business should see it, and pause while looking at it to think of those early pioneers at our business who were proud of it as a specimen of their handiwork, and contemplate to what gigantic proportions the business has grown since.

The casting is now a much valued relic, and the property of the city of Lynn, Mass., having been presented to that muicipality on October 21, 1892. Mr. C. J. H. Woodbury, Vice-President of the Boston Manufacturers' Mutual Fire Insurance Co., made the presentation address, the casting having been previously purchased by him from the family in whose possession it had been since it was first made. After its purchase, a number of the citizens of Lynn insisted upon being allowed to bear part of the expense of presenting it to the city, and subscribed for that purpose, but John E. Hudson, Esq., of Boston, who was born in Lynn, and is a direct descendant of Thomas Hudson, who owned the ground upon which the Saugus Iron Works were built, claimed the privilege of presenting the casting to his native city—a privilege which was granted him, the subscribers then contenting themselves with supplying the tablet and case in which the kettle will hereafter be preserved. The kettle is quite a small one, weighing two pounds four ounces without the cover, and holding not quite a quart. From Mr. Woodbury's address we take the following interesting passages:

As the kettle is an example of the state of the art of iron founding in 1642, so the tablet, forming the rear of the case, is also typical of the skill of American foundrymen in 1892. It is as it came from the mold at the foundry of the Magee Furnace Company, at Chelsea, untouched by tools, and has been treated by the Bower-Barff process, covering it with the magnetic oxide of iron, to prevent corrosion.

There are some original features in the design of this tablet, particularly in the groundwork of the face, of which the pattern was woven bamboo, and the back is in like manner an impression of plaited straw, instead of the tooled surfaces which are used for similar tablets.

The tablet bears the inscription as shown on page 30.

It may be very naturally asked—What is the evidence warranting the presumption that this kettle is, as claimed, the first casting made at the Saugus Iron Works? It is true that this article lacks the stamp and attested record of many witnesses, but, like Plymouth Rock, and

many other important relics of American history, it depends in part upon tradition in a generation devoid of sentiment or personal interest, which might introduce possible elements of error. Tradition has preserved for the world much of its history, essential principles of law, and even vital points in both Jewish and Christian religion.

The design of the kettle is that of a type used in the earliest colonial days, but in its physical characteristics it bears evidence of having been made of iron cast directly from the ore as reduced in a blast furnace, and not from pig-iron re-melted in a reverberatory or a cupola furnace; and there is no evidence or reason to believe that there was either of these furnaces at the Saugus Iron Works.

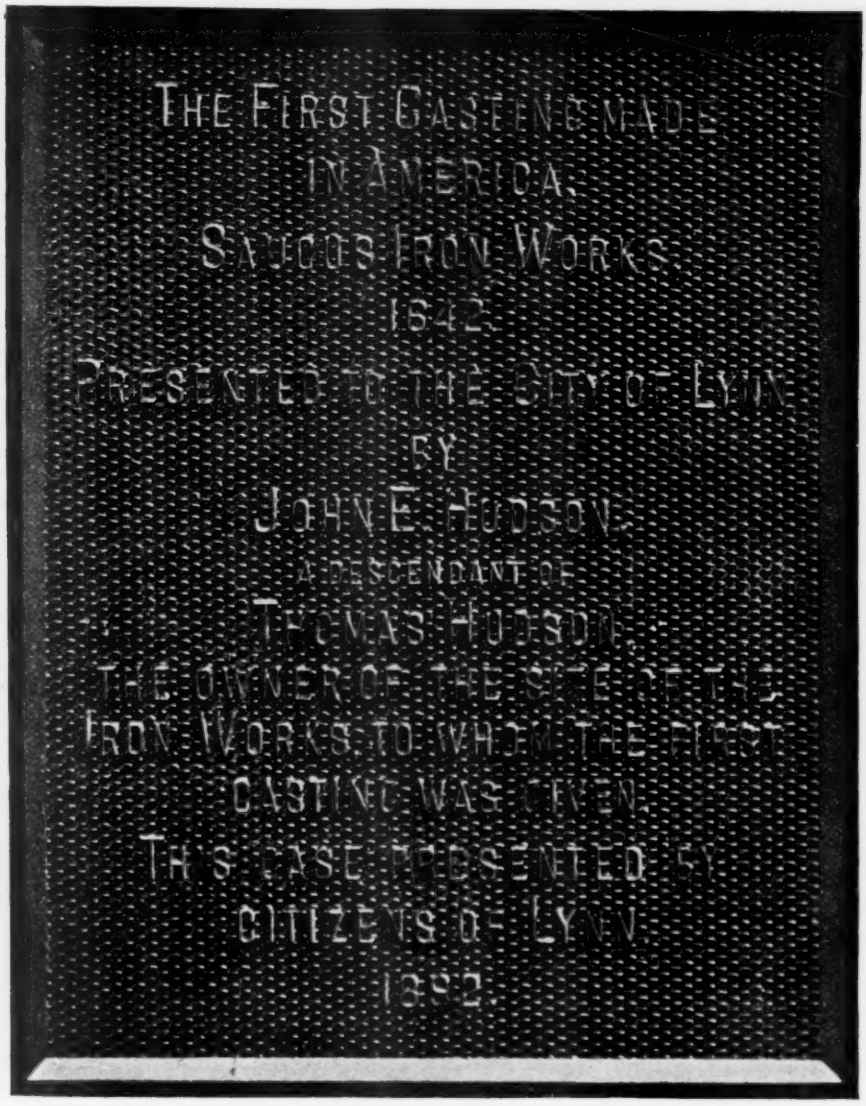
Thomas Hudson owned sixty acres of land on the westerly bank of the Saugus

River, at the present sites of Scott's and of Pranker's mills, and he sold this land to the Company of Undertakers for the Iron Works. He claimed in consideration the first article made at the works, and although not given to idealisms, this kettle was kept by him and his descendants in the male line for over a century, when it passed in the fourth generation to Mary (Hudson) Lewis, who gave it to her daughter, Mary Lewis, and she in turn gave it to her nephews, Arthur and Llewellyn Lewis, from whom the purchase was made. These two brothers well remember the story of the kettle as told by their grandmother, who prized this kettle as an heirloom, whose history had in a like manner, been related to her by her grandparents. The first published record of this kettle is contained under date of 1642, in the History of Lynn, by Alonzo Lewis, 1844, page 122. The same is included in Lewis' and Newhall's History of Lynn, 1890, page 208, and is referred to in every history treating of the Saugus Iron Works. The Standard History of Essex County, C. F. Jewett, 1878, of which the chapters upon Lynn were prepared by the late Cyrus Mason Tracy, contains (page 246) a description of this kettle; and I have in my possession a manuscript written by Mr. Tracy in 1881, in which that able antiquary eloquently referred to it as "the humble prototype of the immense iron industry that now extends over our land." Further references on this subject may be made to vol. I., p. 408, of the History of Essex County, Massachusetts—(J. W. Lewis, Philadelphia, 1888), in which the chapters on Saugus were written by Wilbur F. Newhall, Esq.

The Saugus Iron Works were such an important factor in the inception and early development of American industries that their early history merits due consideration. This was not the first attempt at iron smelting, but the first success. The expectancy for mineral wealth was universal among the early explorers of America. Every royal charter, patent, grant or commission contained exact provisions for the division of precious and base metals, in which the privy purse was to share largely. The avaricious Spaniards expected gold, and abased Columbus because he had not found it in fabulous plenty. The later Spanish explorers pillaged enough gold in Mexico and Peru to trample out Aztec civilization, and in turn ruin themselves. The outline of the western Atlantic littoral had not been fully established before Spanish romancers pictured the unknown lands with strange peoples, who submissively yielded to the conquorors, and bestowed upon them a plethora of precious metals. The thrifty English were not blind to the attraction of mineral wealth, and sought the less alluring but more valuable iron, although that metal was unknown to the Indians, save in a few instances recently discovered by Prof. F. W. Putnam, where the mound builders fashioned meteoric iron into ornaments or implements. The earliest reference to iron ore in America is contained in the History of the Second Expedition to Virginia, by Thomas Harriot, in 1586, wherein he says in reference to Roanoke Island: "Wee founde neere the water side the ground to be rockie which by the trial of a mineral man was founde to hold iron richly. It is founde in manie places of the country else." The hostility of the natives was so intense that the colonists soon returned to England without developing the mines. The Jamestown Colony mined and sent iron ore to England as early as 1608—(W. F. Durfee, American Industries Since Columbus, page 146). In 1622 they built iron works a Falling Creek, a tributary of the James River, about seventy-six miles from Jamestown, for the purpose of reducing bog-iron ore. The works had approached completion, when the Indians attacked the settlement, killing 350 persons, and burning the buildings, March 22, 1622. Thus the enterprise for which skilled men had been especially sent to Jamestown Colony from England, was abandoned—(History of the Iron Manufacture in all Ages, page 104, James M. Swank, Philadelphia, 1892). The Massachusetts Bay Company, at a meeting in London, March 2, 1628, considered the advisability of sending Malbon to New

England to prospect for iron ore, and he was at Salem in 1269, but it is not known that he ever reported any discoveries.

The bog-iron deposits in the upper Saugus meadows were discovered by two men, with Joseph Jenks, one of the best workmen of the day, as master mechanic. Captain Robert Bridges was one of the leading men of the settlement, having been entrusted with diplomatic offices on the part of the colony of Mas-



Thomas Dexter, one of the colonists, and he informed his fellow-townsman, Capt. Robert Bridges, who went to London and formed the Company of the Undertakers for the Iron Works, which was started under the management of these

sachusets Bay, and of whom it was said by Nathan M. Hawkes, "No man who lacked suavity and winning social manners could have persuaded calculating London merchants to have ventured their dearly loved funds in an iron

works experiment across the Atlantic in a savage and unknown land"—(Magazine of American History, vol. xxv., page 150). The site of the iron works was well selected, being situated at the head of navigation, by the ford in the highway from Boston to Salem, at a water-power, and near to the bog-iron ore deposits, whose exact location is unknown, save that they were in Adam Hawkes' meadows. The whole iron works tract probably covered three thousand acres. The General Court granted them at various times immunity from import or export duties, and from taxation, and other privileges. I believe that the act of October 14, 1645, is the earliest instance of legislation upon the principles of protection to manufacturers which has been such an important feature in the development of American industries..

The act is a long document, but the following extracts are of especial interest:

"5. . . They shall have free liberty to transport the same [their iron] by shipping to other parts or places of the world, and to make sale thereof. . . . Provided they sell it not to any person or State in actual hostility with us.

"7. It is also granted that the undertakers and adventurers, together with their agents, servants and assigns, shall be and are hereby free from taxes, assesments, contributions and other public charges whatsoever, for so much of their stock and goods as may be employed in and about the said iron works, for and during the period of twenty-one years, yet to come from the date of their presents."

There is not any detailed description of the works, and the exact methods employed, but there is much light thrown upon these matters in the voluminous records of continual legislation and litigation, which took place during the forty-six years that the works were in operation. The works contained a blast furnace, in which bog-iron ore was reduced by means of charcoal, using as a flux, lime which in the earliest days of the works was obtained from the oyster-shells which then abounded on the coast of Massachusetts Bay. Cannon were also melted at this foundry, far in advance of the time when swords were to be beaten into plow-shares, or spears into pruning-hooks. The iron from the blast furnace was run into straight trenches in the sand, and thereby cast into long, triangular bars called "sowe iron," which were converted into wrought-iron and steel. Castings were made directly from the metal flowing from the blast furnace into a pool, whence it was dipped by crucibles and poured into the molds. The cupola furnace was not invented until 1790. The manufacture of wrought-iron and steel must have been entered upon contemporaneously with that of cast-iron, as John Endicott, of Salem, the first governor of Massachusetts Bay, wrote to Governor John Winthrop, at Boston, December 1, 1642: "I wish to hear much of your son's iron and steel"—the son being John Winthrop, Jr., who was interested in the Saugus Iron Works.

The wrought-iron and steel were made in a blomary, which may be described as a charcoal fire four feet thick in a blacksmith's forge. The end of a bar of sowe iron was plunged into the fire, and in time a pasty mass of wrought-iron would settle to the bottom. Other portions of the bar would be converted into steel when the process stopped at the intermediary stage between cast and wrought-iron. This process of steel making is still used throughout the oriental nations, and also in the mountainous region south of the Ohio River.

The iron works also included a machine shop, in which the first fire engines made in America were built for the town of Boston, in accordance with a vote of the town meeting, March 1, 1654, that "The select [men] have power and liberty to agree with Joseph Jynks for Ingins to convey water in case of fire, if they see cause so to do"—(Brayley, History Boston Fire Department, 1889, p. 7).

Although the iron works were in operation very soon after building was commenced, yet additions were made made during a number of years. In

1645, an order of the General Court shows that the works had "some tons of sowe iron cast and some others in readiness for the forge," and letters of Governor Winthrop in August and September, 1648, state that the furnace produced seven to eight tons per week. The principal product was bar-iron "as good as the Spanish," costing £20 per ton, also axes and agricultural implements.

When Governer John Endicott began the Oak Tree and Pine Tree coinage in 1652, the dies were made by Joseph Jenks at the Saugus Iron Works—(Early Coins of America, S. S. Crosby, Boston, 1875, p. 79). It is stated by Judge James R. Newhall that the designs were made by Elizabeth, the wife of Joseph Jenks, the master mechanic—(Lin, 1880, p. 78). This coinage bearing the stamp "Massachusetts State" without any reference to the throne, was probably the first fundamental act of independence to the mother country. The colonists were driven to such a course by the lack of money, as exchanges were for the most part carried on in barter, with bullets and wampum serving for small coin. Joseph Jenks also invented a saw-mill, which received a patent for fourteen years from the General Court on June 10, 1646, being the first patent granted in America, and also a water engine for mills, which was undoubtedly a form of water-wheel, and not the hydraulic engine which that term would now signify.

He also invented the modern American scythe, long and narrow, and stiffened by a ridge along the back, a marked improvement "for the more speedie cutting of grasse" over the broad, short, bushwhack scythe made from a thin plate of steel, and richly deserved the patent for seven years which was granted by the General Court, May 23, 1655.

In 1667 he petitioned the General Court relative to a wire manufactory; and May 15, 1672, his petition for authority to coin money was refused.

The litigation to which the iron works were subjected increased and became oppressive. It appears as if the impulse to "sue the corporatiou" was instinctive among the townspeople. The corporation, its managers and its workmen were proceeded against under every concievable excuse. The boundaries of worthless land, poor crops on sterile soil, unrestrained courtships, speaking lightly of the governor, reproachfully of the church and harshly of the king, were all subjects of long continued and bitter litigation. Land was sold to the corporation and afterwards further damages claimed. Dexter brought suit because the alewives did not come into his net below the dam as of yore, and Hawkes sued because the water rose too high above the dam. The town sued the corporation for pew rents in a meeting house several miles distant, and notwithstanding the immunity in the act of October 14, 1645, already quoted in part, won the case. The pews could not have been worn much, for the courts took action against the managers for not attending public worship.

The works are not known to have been in operation after 1688, when the tract had diminished to six hundred acres and passed to individual ownership. If the supply of bog-iron ore had been sufficient for the works, they would undoubtedly have been continued the same as other enterprises of that day in various parts of New England. The immediate return to those engaged in the enterprise is now of little moment, but the results to the whole colony of an establishment which attracted, developed and then scattered a body of skilled mechanics, were of great importance, and no doubt may have been an essential factor in rearing many prominent industries.

The Whitely Malleable Casting Co., is a new concern at Muncie, Ind., with a a capital of $200.000.

The Missouri Car & Foundry Company, Birmington, Mo., have commenced operations again after a long shut-down.

The Berlin Iron Bridge Company, of East Berlin, Conn., are putting up a new foundry for the Watts-Campbell Co., at Newark, N. J.

BILL NYE ON RADIATORS.

THAT genial humorist and prolific newspaper contributor, Edgar W. Nye, frequently touches upon matters practical and technical in a way to put the doctors and experts to rout. Witness the following on radiators, with poor piping and faulty system, being extracts from a recently printed copyrighted syndicate article by the author named. Our own "Tank Manning," with his facile pen dipped in his favorite fluid, sarcasm could scarcely equal it, if he took a day off for the purpose. Mr. Burbank, mentioned in the following, it should be remarked, is the friend and companion of Mr. Nye on some of his peregrinations. Mr. Nye writes:

The steam radiator at a hotel furnishes more cause for serious thought, especally in the still watches of the night, than any other problem I know of. Most of them have water on the brain.

When you go in a room and smell the hot, damp carpet, you know at once that the radiators are not seaworthy. The other night Mr. Burbank's radiator began about midnight to get restless and palpitate. At first it gave just two or three kicks at itself and moaned. Mr. Burbank turned over in his bed and said:

"Ah, the radiator is repairing itself." Then he went to sleep.

Soon after he awoke with a start and heard the radiator rumble like a distant freight train crossing three or four other lines of road. At the end she seemed to hit one coil with another and began to mix things.

He looked at his watch and saw that it was 12.30. Tired nature then yielded, and with a long-drawn sigh at thirty days he went to sleep. He awoke again to hear the radiator riveting its boiler and generally refitting itself.

He lighted his last match and saw that it was 1.30. He tried to go to sleep, and began counting one thousand to settle his nerves. He was joined by the radiator. He threw off the covers and said:

"There is water in that radiator. That's what makes it practice all night trying to play 'The Awakening of the Lion.' I will let the water out and then I can sleep."

So he got up softly and started for the electric light to turn on the same. He was a little dazed, and stepping high, he stepped into his trunk. Then he knew where he was, and started across the room, but was met by the centre table, which had a late lunch on it. It cortained, among other things, some bread with jam on it, and some cheese that had come from Germany at a time when the quarentine regulations were looser than they are now. He upset this table.

"Now I know where everything is," said Mr. Burbank. "The cheese is in the centre of the room, and I can always find out where I am, even without a light."

Just then, in trying to turn on the electric light, he stepped in the cheese and jam at the same moment. He also found that the electric light had been turned off at the cellar.

No one can know just how he would feel under these circumstances. Mr. Burbank had now lost all idea of direction, for the cheese still clung to the sole of his foot, and roamed around the room, attracting attention from the radiator.

He went three times around the room, feeling on the wall for the button of the bell, but missing it, as he could not get the right height, he opined. In the morning he found that the button was concealed by the headboard of his bed and did not work anyhow.

It now became easy to locate the radiator by the sound it made, also by a little puddle of hot water which he stepped out of with such a wild start that he skinned his knee and hopped around over the lunch in great agony. As he felt the jam oozing up among his toes he became irritatad and said:

"If I had to do it over again I would go to the other hotel."

There were two hotels: one called the Phyloxeria, and the other the Bergamot House. We were at the Bergamot.

Mr. Burbank approached the radiator and turned the valve open quickly, then stepped back into the Halford sauce, as a stream of hot water squirted across the room into the cosy bed which he had just left. The little valve nut was now so hot that he could not turn it back for quite a long spell, but after a while by the use of a towel, he managed to turn it off enough so that only a small stream came from it, and he filled a china cuspidor with water, also the wash basin and his valise. This he did while trying to empty the basin out of the window. A great deal of the water was spilled when he stepped on the Halford sauce bottle again.

He emptied the basin while the cuspidor was filling, and then emptied it while the basin was filling.

Sometimes in going back and forth he did not step on the Halford bottle at all.

He does not remember how many times he did these round trips, but as the gray dawn began to steal timidly across the sullen sky there stood at the open casement a tall man with a pale, intellectual face, and in a simple, fluttering and severely plain negligee with wet sleeves. He was just pouring the last pitcher of hot water out of the window, and below lay the body of the watchdog —drowned.

The watchdog lay with glassy eyes chained to the house, and the watchdog's honest bark was peeled off in places where the hot water had struck him.

The moral of the above incident is that the man who is wise and who has been abroad as far as Escanaba, Mich., or Esquimault, B. C., will open the escape valve of a radiator when it acts that way, and let the hot water "squirt, and squirt, and squirt." He will not try to save the carpet.

Warder, Bushnell & Glessner, are building a new foundry at Lagonda, Pa., 550 feet long and 80 feet wide.

Young & Thatcher's car-wheel foundry, at Elizabethport, N. J., has been burned. The loss is placed at $8000. Valuable patterns were destroyed.

John Seaton's foundry in Atchison, Kas., has just completed a large contract of fine ornamental stair work for a Pueblo, Colorado, hotel.

THE Valley Foundry and Machine Works, at Montgomery, W. Va., which were recently burned, will be rebuilt.

CORE MAKING.

CORE making is hardly considered a trade, yet to be a good core maker one must understand the natures of the different sands used. The core shop of a foundry is gnerally located in the darkest corner, and almost always a boy or laboring man is placed there to make the cores. This is a great mistake. A good core maker must know how to use the different sands required in his business to the best advantage; he must be a live, energetic man, with plenty of neatness and dispatch in his make-up, or he is "not in it" with present methods; he must be full of grit, ready to do a little hustling when necessary, and should always be ready to devise a make-shift for a short-notice job; he should, when needed, be able to go into the foundry and work at dry-sand molding—in fact he should be able to perform the duties of a dry molder.

The principal sand used is what is known as "sharp sand," of which there is quite a variety. There are Beach, Lake, River, Crushed Rock and Bank sands. For small or medium sized cores these sands are excellent where a quick vent is required. Loam sand is used to give body to sharp sand, and at times is very necessary. Some foundries use floor molding sand for the same purpose, but it is not so good—it is liable to crack and sag, and it is not so open and porous as it would be with the loam sand. River sand is far superior to any other sharp sand for large cores, it is more coarse and open. Mix two parts of river to one part of loam sand with the proper amount of flour or compound and you will have a sand that can be used for general jobbing work without any fear of it cracking or sagging. Beach sand requires less flour or compound than any of the sharp sands. For small work it is the best sand in the market. Lake sand and crushed rock ranks next to beach. These sands should be used for difficult and intricate cores that require special venting. They will give splendid results. Bank sand should be used for cores that do not require special venting.

PRACTICAL.

THE FOUNDRY

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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CALLING THEM OFF.

"EVERY returning visitor to the World's Fair is becoming an active missionary in his home in behalf of that grand undertaking. The influence of this labor of love can hardly be overrated. The enthusiasm of a friend or an acquaintance is catching. It is far more convincing than columns of cold type. Doubts are dispelled, objections are quickly overcome, and the conviction is reached that the ways and means must be carefully studied to settle the question whether a visit is feasible.—We may confess that we have been taken by surprise by the unanimity of the enthusiasm aroused with persons differing widely in temperament and in tastes. A good deal of downright wicked work on the part of some of the daily newspapers—notably in the East—is being undone now by those who come home to relate their experience."

The above we clip from a very strong editorial in the *Iron Age* of July 13th, and in view of the position previously taken by THE FOUNDRY we reproduce it here as showing that there exists serious grounds for complaint when such a conservative paper in such matters as the *Iron Age* feels called upon to apply the term of "downright wicked work" to the slanders which have emanated largely from its own city. The Fair is greater, grander, more magnificent and more instructive than it lies in the power of man to imagine, without going there; and the papers criticising it do so because their editors are troubled with biliousness.

FOUNDRY EXHIBITS IN CHICAGO.

IN the Mining Building there are one or two interesting exhibits; but the main one of interest to foundrymen, especially those who admire fine, artistic work, will be seen in the Russian department, where is displayed in the most tasteful manner possible a large number of light, ornamental castings, showing a remarkable degree of excellence in workmanship. The display consists of small statuary and figures, vases, iron plates of various open designs, and a great variety of ornamental articles about which the most surprising thing is that they came from a country from which we in America have never been taught to expect much in that line, but it is doubtful if any single American establishment can show its equal, and we most earnestly urge every one to see it.

This work is made in the Kaslinsky foundry of the Kishtimsky Iron Works. These works are situated in the city of Ural, in what is known as the Government of Perm. That it is an extensive establishment is proven by the fact that they use about 3,000 tons of pig-iron per annum.

In this building also will be seen in the gallery the first casting made in America, and which is said to have been cast at Lynn, Mass, in 1642. There is also an exhibit of some fine molding sand on the main floor, shown by Eugene Martine; also some molds in various stages of completion, and the casting of a head, which is remarkable for its fineness and perfection of detail.

"HOPE SPRINGS ETERNAL IN THE HUMAN BREAST."

ON every hand we meet the inquiry, "What will the harvest be?" The busines man, worried by the oppressing condition of the existing financial situation, anxiously inquires of his neighbor as to his opinion of the immediate future; the employee, with a family depending upon his daily labor, awaits some prospect of re-employment; the financier, with vast interests at stake, feels powerless in the face of a general depreciation of values and the absence of confidence and cash, but tries to keep up, not alone the courage of others, but his own as well, by taking a cheerful view and predicting prosperity. And right here is to be found the greatest ground for believing that the present oppression is only temporary. This is a busy world, and America is the busiest part of it. Great and astonishing are the things that have been accomplished in a business way during the lifetime of any, even young man in this century. Success and successful men are all around us—here, there, and everywhere. Their example is before us all. It permeates everything we say and do. It is in the very atmosphere, and unconsciously impels us, as we hurry amidst the crowded thoroughfare, or transact the business affairs of our daily life. And it will continue to do so.

There exists no serious, deeply laid reasons for all this financial unrest and stopping of the wheels of trade. We may, perhaps, have a little over production, too much trade, and an unwarranted extension of the credit system which will at least be temporarily checked, if not permanently stopped, by the halt which has been called, leaving us really better off in the end than we were before. Aside from that there is nothing to be feared. This is a great country; we are an energetic people; there is a great amount of money in circulation; our resources are simply too vast for comprehension; and, as soon as our present fears wear off, and the demand for profitable investment compels the timid ones to unlock their treasures—as they soon must do—the wheels of commerce will commence to revolve with increasing velocity. We are naturally sanguine, and it is human nature to invariably anticipate something better for the future. It is a sentiment that is with us from the cradle to the grave, and no matter how we may differ on other things, we are universally alike in this respect; and in this one thing, more—a thousand times more—lies our safety in times like these, than all Congressional enactments, foreign policies or monetary regulations, than are possible under one form of government.

In conclusion, again we say that we have the greatest country, the most energetic, ambitious and intelligent people, and are always going to have the greatest measure of prosperity.

These are our securities—our national collateral, as it were—and in the opinion of THE FOUNDRY, we will begin to realize upon them before the close of the present year.

CANADA.

IN the July issue of THE FOUNDRY we had something to say concerning our sister country to the north of us—Canada—to which one of our subscribers takes exception to by sending us a couple of newspaper clippings containing some favorable comments on the Canadian banking system, and the recital of some few of the many business failures that have recentiy occurred in this country. This does not, however, alter the force of anything we thought at that time. Several of Canada's best known firms have gone to the wall during the past few years, and we can all remember the series of disastrous bank failures that swept over that country not many years since.

What we said was that Canada would be better off if it had an entirely separate government of its own, and could make, unhampered, any trade or other relations she might see fit with this country; and if our Canadian friend does not believe it he should take a trip through the United States and interview some

of the millions of Canadians who have come here to seek their fortune, and are now happy, prosperous, and many of them wealthy. There are alone as many Canadians in the United States as there are in Canada. *Now, why is this?*

HARTSFELD AGAIN.

WE thought we had heard the last of the Hartsfeld Furnace and Refining Company, but they seem determined to keep up their policy of swindling and misrepresentation.

Some time ago, before they or their methods became known, they succeeded in persuading the J. D. Smith Company, of Cincinnati, O., to permit the use of their name in their literature as their agents, but as soon as their questionable methods were discovered the Smith Company notified them not to use their name further under under any circumstances in connection with their so-called alloy, and although repeatedly warned and threatened, the Hartsfeld people have never paid any attention to this request, and as they are entirely irresponsible, the J. D. Smith Company feel naturally aggrieved to think that their name has ever been used in connection with such a rascally institution, and at their urgent request we make this explanation to, as far as possible, warn the foundry world against a set of sharks who would not hesitate to injure a reputable firm if it suited their purpose.

A YEAR OLD.

A year ago this month preparations were commenced for putting into operation a long cherished idea of starting an exclusively foundry paper.

The first number appeared in September, 1892, and consequently this number closes the first year. We had long been sanguine as to the success of such an enterprise, but now we have that success and know we are right. We have received support and encouragement from many sources, and take the opportunity of letting our myriads of friends know that we appreciate the fact that this success is due more to their kind interest in THE FOUNDRY than to any claim we could be justified in making as to its merits.

In one year it has doubled in size, and when some contemplated improvements are carried out, we think our army of friends in all parts of the English speaking world will be more than pleased. We do not care to be boastful, because we know the hollowness and uselessness of that sort of thing, but nevertheless we believe that we are justified in saying that we have now, at the end of our first year, more foundry readers than all the other trade papers in this country put together, and those we have not got we are going after, and going to have.

BUSINESS BOUND TO IMPROVE.

Before this paper reaches our readers Congress will have assembled, and we hope, got down to business. There will be more or less skirmishing all along the line at the commencement, but the eyes of every intelligent person will be upon that Congress in a way they have never before been in the history of the United States.

They will be allowed a small amount of latitude for some of the Tom-foolery which seems to be indispensible with that body, but the moment it appears evident that any man or set of men, from selfish motives, sectional prejudices or any other cause, undertake to block the wheels of legislation, there will go up a mighty protest from the mass of the people in this country that will make itself heard and felt in that very large room on Capitol Hill where our congressmen so often appear to be indifferent to the wishes of their constituents.

The people are aroused, and the beauty of this thing is that they are getting a degree of education on matters of national finance which nothing else should give them, and are as a result not in any mood to stand any trifling. They want relief, and they want it quick, and, while innumerable plans have been proposed, they are in the main indifferent as to which are adopted so long as the desired result is obtained, and as far as it is in the power of our legislature to help us, we believe the best can be expected very shortly, and before our September issue is printed a far more buoyant feeling will prevail.

THE Pittsburg *Dispatch* says: "The great traveling crane, worked by electricity, has been erected at the Edgar Thomson Steel Works. It is a massive affair, and has been successfully tested. William M. Pierce, electrician of the company, had charge of the test. It was witnessed by all heads of departments and almost all the employees about the big plant. The crane will raise about one hundred tons. It will operate ladles exclusively. It is said to be the first time electricity has been used in the Western Pennsylvania industrial world for the operation of such heavy machinery."

THE FOUNDRYMENS' ASSOCIATION

THE regular monthly meeting of ihe Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Thursday, July 6, Thos. Devlin, of Thos. Devlin & Co., Philadelphia, occupying the chair in the absence of the president.

The attendance was not so large as at previous meetings.

The minutes of the last meeting were read and adopted.

The executive committee reported that at its last meeting some discusion took place in regard to the circular recently issued by the association to other associations formed and forming, and it was finally arranged to await answers from all points, no action in the meantime to be taken and no departure from the usual proceedings of the association to be made. It was desirable, however, that the association should help other bodies in any way possible calculated to benefit the foundry trade all over the country. As to the state of trade, the report stated that almost every foundry had taken steps to reduce the cost of production, although the price of labor remained the same as for years, and was an important factor in the case. It seemed as though something should be done to make both ends meet at the end of the year. At the low price of castings in the open market it would seem that the only remedy would be a reduction in the cost, or a higher price for the products. The committee invited discussion upon the report.

The special committee, which iucludes the price committee, then reported by sections. P. D. Wanner, of the Mellert Foundry and Machine Company of Reading, Pa., representing the iron pipe trade, reported that in that line the trade was holding its own very well under the present condition of affairs in the country. Pipe foundries, as far as he knew, were pretty well filled with orders, and were particularly pressed on some sizes of pipe. Prices remained about the same, although they may have run a little higher occasionally on sizes for which there was not a usual demand, but in general the prices were not as good as the demand would warrant. He supposed the condition was in keeping with everything else at the present time. Everybody seemed afraid to ask anything like a fair price or profit for their productions. A year of low prices would seem to be ruling pretty generally. In the East founders were a little timid on account of the Southern pipe makers. The condition of the market in the East might have warranted an advance in prices, but the life was knocked out of the trade by the low prices at which Southern founders were offering. Pipe was being delivered all through the East as far as Bangor, Maine, by Southern pipe founders, and in some points it had been offered at prices at which Eastern founders could not begin to produce. This competition, he said, of course tended to promote timidity, and sales were being made bearing the smallest possible profit in order to keep foundries going and men employed.

E. E. Brown, of E. E. Brown & Company, Philadelphia, representing the sash weight section of the committee, in reporting for his section, said that he was glad to say that a little improvement was noticeable, but there was still room for large improvement, particularly in the New York market. In the Philadelphia and New England markets prices were fairly good, he might almost say profitable. In the New York market they were, if anything, lower than before.

Stanley G. Flagg, Jr., of Stanley G. Flagg & Company, of Philadelphia, Pa., representing the malleable iron castings section of the committee, had nothing to report. The trade was in bad shape, and there had been no change of late.

R. A. Register, of Register & Sons, Baltimore, Md., representing the cast iron soil pipe section of the committee, reported that the demand for stock continued good. He said that in view of the high quality of soil pipe required for the Philadelphia trade in order to comply with the sanitary regulations,

an arrangement had been arrived at between the manufacturers for the purpose of elevating the standard of their respective manufactures. The arrangement come to will go into effect at once, and necessitates an advance in prices.

The Riehle Bros. Testing Machine Co. were elected to membership in the association.

The secretary announced that Dr. Kirk, who had arranged to be present at the meeting and deliver an address on the subject of "Melting and Fluxing in Cupolas" had not appeared, and his absence was unexplained. There was present, however, William C. Henderson, chemist for Thos. Devlin & Co., who would address the meeting on a subject of interest to all present. Mr. Henderson then addressed the meeting on the subject of

CHEMISTRY, AS APPLIED TO THE IRON FOUNDRY INDUSTRY.

He said: I have been requested to address you this evening upon the subject of "The Value of the Chemist's Services as Applied to the Iron Foundry Industry."

The methods employed by the chemist in arriving at conclusions is so imperfectly understood by the laity that the manufacturer of the cruder products of iron is not always in a position to decide whether their adoption would be of advantage to him or not. I qualify the statement in this way, because in the higher branches of iron and steel making the chemist's position is of such recognized importance as to render impossible all thought of operating without him. I am pursuaded that in the case of many foundrymen there exists a strong prejudice against any departure from their time-honored manner of running their foundries, which predisposes them to regard the work of the chemist as being an expensive theoretical nicety incapable of practical results of the character in which they deal. It would be well before passing judgment for each foundryman to ascertain just what the chemist can do, how he does it, and whether the same ends may be achieved in any other way. Investigation will show that in forming his deductions the chemist's mode of procedure is singularly simple, reasonable and practical. As a result of years of exhaustive scientific experiment, theory and actual practice, the records of which are most complete and voluminous, it is known that certain impurities in material produce certain characteristic effects upon the physical behavior of manufacture resulting from its employment, that certain combinations of impurities produce certain other effects, and that in process of conversion which is in every case a chemical one, these impurities may be eliminated, retained or forced into combination with others according to fixed laws and conditions to which they are subject.

I use the word impureties in its strict scientific significance, and it is not to be supposed that their presence is in every instance objectionable; for while the existence of some is attended with wholly injurious results, and the abnormal content of any is productive of pernicious consequences, it is at the same time due to the properly adjusted proportions of others that desirable requirements are met that would otherwise be impossible. To properly adjust these proportions to effect the physical constitution demanded in the final product calls for ability of the highest order; for the line, on either side of which an element may not enter into its composition without disaster, is not always clearly defined. The influence exerted by other elements present, in neutralizing or augmenting properties identical to one, and the modified reaction occasioned by a change of conditions—such, for instance, as conducting the operations in newly lined vessels—are mere hints as to difficulties presented; and it is in the solution of this problem that the chemist's capacity is unique; for, equipped with this knowledge he proceeds to determine, with absolute accuracy, to what extent these impurities exist in the material at his disposal, and he causes at will their ultimate dispensation in accordance with the physical end towards which his efforts have been directed. This undertaking is, indeed, so formidable that one may well pardon, in those not familiar with

the possibilities in the manufacture of the higher grades of iron and steel, skepticism as to its achievement. A glance, however, at the specifications to which the metal used in the construction of our nation's ordnance must conform will dispel any doubt in the matter, and this is but an instance of requirements the every-day fulfiillment of which is made possible by the work of the chemist.

To the iron founder, perhaps, among the more direct and comprehensive advantages that would follow the employment of a chemist would be his ability in the purchase of material; to intelligently take advantage of low prices, and in only acquiring such as would be best adapted to his purpose; to tell whether or not he could make use of a material and what results would take place in the event of its use—and this, be it remembered, before the material in question is even purchased; to exactly reproduce physical qualities in manufacture, without using any of the original material, and in affording protection generally to the founder against deception; for, under the chemist's inspection, it does not suffice that certain material should have a good reputation simply, it following, of necessity, that such material must stand upon its intrinsic merit. Occasions are not wanting where imposition has been practiced in furnishing material of good quality until the reputation of the brand is fairly well established, when material of an inferior nature has been substituted.

Any attempt of this kind, where the material is subjected to chemical examination, would result in instant detection. I include under the general head of "material," pig-iron, iron scrap, fuel, brick, clay, sand, oil and in fact everything used about a plant that is liable to any variation from a fixed standard, or in which certain qualities are desired. In enumerating the many advantages accruing to the iron founder from the employment of a chemist, it is presupposed that the work is in the hands of one who is in every way qualified and experienced, and who embraces also a thorough knowledge of metallurgy; that an unstinted equipment of the necessary apparatus, etc., is furnished him; that every reasonable facility is afforded him to properly carry forward his work, and that due attention is given to physical as well as to chemical testing, for it is only in their joint application that the full value of the chemist's work is realized in its entirety.

A word touching the relative value to the iron foundryman of physical as compared with chemical testing may not be out of place here. It must be obvious to all that the actual service to which manufacture is put when occupying the position for which it was made, constitutes the most complete physical test that it is possible to concieve, and as the chemist's knowledge has, in the first place, been derived from, and his sole aim is, in the last place, to meet this test, it might be said that he is wholly independent of any system of tests other than chemical ones, and it could be so said with truth, so far as present knowledge is concerned. But as the limit to learning has not yet been reached it is an aid in advancing his information into unknown fields that physical testing is most essential to him; though of course it is of great importance in checking his work. But what of permanent avail is accomplished by the application of physical to tests material the chemical composition of which is unknown? The very utmost that can be hoped from such tests is to establish the fact that a definite lot of material in hand is either good or bad. But absolutely nothing has been gained toward the estimation of future lots, every parcel of which has to be heated in the same aimless way, whereas a fact once established by chemical research remains fixed for all time. When it is known that a certain percentage of an element in a material under certain conditions produces a certain physical effect, every time these conditions are reached in this material having the same percentage of the element this identical physical effect is obtained and no other.

Some may argue that, because in supplying at a profit manufacture to the satisfaction of their customers, there exists no need for a change in their business policy. This sort of reasoning, aside

from its inconsistence with the progressive spirit of the times, by no means shows that their output is the best that could have been produced at the same cost. That their customers are satisfied may simply be the result of their ignorance as to higher possibilities in such manufacture, and enlightenment in this matter will doubtless bring with it a corresponding loss of custom. The various shifts practiced by the iron foundryman with a view to estimate the value to him of certain material appear grotesque in comparison with the methodical system employed by the chemist, and I believe that very little is attempted beyond the testing of pig-iron. In this instance the custom seems to be to charge a new iron, and if the resultant castings look all right the iron is considered good and is put on the list of good irons; but should the entire work of the molder be destroyed and a lot of metal to be remelted be the outcome, then the iron is regarded as bad, and that brand is to be ever after avoided.

This very often causes gross injustice to be done to the pig-iron producer, for if it proves anything at all it simply shows it with relation to that particular lot of iron used, it being quite possible for the iron from the same furnace to be at one time in every way suitable for a certain purpose, and at another totally unfit for use in like manner. But I go so far as to say that, whatever the outcome of this test, it need not necessarily prove anything at all; for, in event of a satisfactory result by this test from the use of a certain iron, it is possible that the iron in question might still be such as would be unsuited to the founder's peculiar purpose, but has, in the process of melting, neutralized the effect of another iron in the mixture equally as undesirable from an opposite cause, and the effect has been due to mere chance, and *vice versa*.

It must be within the experience of every foundryman that dire results have taken place, even though he was using material with which he thought himself perfectly familiar, and for which he is perhaps unable to account even to this day. He should bear in mind that impurities in his fuel and other material besides pig-iron play a most important part in his operations; and, although these have not entered into his calculations, such failures may be directly attributable to their normal existence. Many foundrymen are wont to lay great store by a name, and certain brands of iron are known to them as good irons or bad irons; indeed, in some cases a particular brand of iron is believed by them to be absolutely essential in the manufacture of their castings. Certain wily pig-iron men practice upon this delusion and obtain one or two dollars more per ton for their iron than it could be advantageously replaced for by a vastly superior article.

The fallacious nature of the belief that because an iron of a certain name has at one time given good results the same good results will always follow its future use, will appear when it is known that the variation, in even the same cast of pig-iron, is sometimes considerable. Pig-irons are commonly spoken of among foundrymen according to some physical quality which they possess, such as "soft," "strong," "tough," etc. They do not know what causes these irons to possess these physical qualities, but, by their demand for them have forced the pig-iron producer to learn the cause, and in his effort to meet this demand have rendered the presence of the chemist at the blast furnace of almost universal necessity. At the mines he is indispensible, because the ore is sold according to the percentage of iron or other metal contained, and its freedom from deleterious impurities has considerable bearing upon its value. That he is not in more general demand among iron foundrymen would seem to speak well for the hitherto profits in the business, but as each year brings with it a demand for lower prices it is only a question of time when the manufacturers in this important industry cannot afford to make needless mistakes, and the chemist's identity with the iron foundry will be assured.

In each progressive step advanced in the development of iron, from its first imperfect reduction from its ores to the production of the nickel-steel armor plate which causes to crash into harmless

fragments projectiles hurled with the most destructive force of which man is at present capable, chemistry has played a part second to none. In a word, every change that comes over iron in passing from one state into another is a chemical reaction, and to whom could its conduct be better intrusted than to the chemist?

At the conclusion of the address Mr. Henderson was tendered the thanks of the meeting.

Walter Wood, of R. D. Wood & Co., of Philadelphia, said it had always been a puzzle to him why chemists were not more useful to iron founders. Not that the iron founder was ignorant, but because of the elements or impurities to be found in pig-iron. Founders remembered an iron that had plenty of posphorus in it, or a large amount of maganese or sulphur, and they avoided it. What they required was a No. 1 pig-iron carrying a certain amount of carbon and silicon. In running a blast furnace the first three elements were elements which largely controlled the furnaceman's operations. The question of carbon and silicon, elements which a foundryman mostly depended on, were conditions which a blast-furnaceman could not closely guarantee. Besides the assurance that there was no sulphur or other product deleterious to manufacture in the iron, it should be shown exactly what was the silicon and carbon in it in order to enable the foundryman to handle the metal carefully and undrstand it. To employ a chemist in a foundry without such assurance from the blast-furnaceman meant an analysis of every cast and every car-load. Foundrymen were in the habit of judging as to the carbon by the color, and probably thus came to the conclusion that a chemist was not as useful as he might be, and trusted to the mixing of three or four different irons to strike an average, letting the mixer reduce that average to as near a certainty as possible. He would be glad to be corrected and have some light thrown on the question.

Mr. Henderson, in reply, said that a chemist could make any grade of iron desired, accidents excluded. The question of shrinkage was the main question a foundryman had to deal with. If the melting point of wrought-iron was compared with the melting point of cast iron there would be found a marked difference in the number of degrees of heat necessary for the melting. It should first be ascertained what occasioned that tremendous difference, and a chemical analysis would reveal the fact that one was almost pure iron, while the other contained what might be termed impurities. It was fair to suppose that the impurities were the cause of the change in the melting point. Certain impurities were found to be deleterious—such, for instance, as maganese, sulphur and others. In fact they would be objectionable unless handled with great care. Silicon had the effect of correcting shrinkage, for the reason that it had been ascertained that the purer the iron the greater the amouut of heat required to melt it. It was a natural law that all bodies contract on cooling and expand on heating, consequently the greater the heat the greater the expansion. The farther apart the atoms of metal get when in a melted state the greater distance they had to come together in cooling. This was shrinkage. If the temterature of the metal could be reduced to the smallest possible degree and the metal held in fluidity, then would be reached the highest point from which shrinkage was to be ascertained, and in consequence the chemist selects an addition to the mixture considered to be the least deleterious to effect a reduction in the melting point of his metal. If he goes too far and uses too much silicon he causes the article manufactured to be extremely brittle. Silicon has a tendency, when existing in high proportions, to make an article of low tensile strength, therefore it is necessary to know how far to go when using it.

P. D. Wanner thought that it was generally believed that the pig-iron of the present day was not as good as it was ten or fifteen years ago. That was the opinion prevailing at Reading. Producers were careless as to the quality of ore melted, and were forcing their furnaces with the object of turning out as large a quantity as possible, without regard to

quality, on account of the low prices current. This being the case, it became more important for the foundryman to mix his iron, or to get to understand his iron so as to bring about good results. Silicon was very necessary in the iron used for making pipe, particularly in the larger sizes, so as to prevent undue shrinkage, and it could not be dispensed with. Iron possessing a good deal of that element was required. Too much caused the pipe to become brittle and thus entail a great deal of trouble, as he knew by experience. He had had trouble with a certain brand of iron which ran hard and white. He would like to know what was wanting in that case.

Several things, Mr. Henderson said, would cause iron to run white, sulphur having a remarkable effect. Sudden cooling would also cause the condition. It was likely, too, that the iron was low in graphitic carbon and high in combined carbon. Change in the temperature in melting when the iron contained a small amount of graphitic carbon would cause it to run white.

Mr. Wanner presumed that in order to meet the case it would be necessary to add another iron to the mixture sufficient to supply the deficiency existing.

Stanley G. Flagg, Jr., said that he had long intended to raise the question among members of the association as to whether it would be practical or possible for the association to go more fully into the technical part of the foundry business. He could not imagine a man melting a small heat of iron affording to employ a chemist. In Germany, foundrymen's associations such as this have technical connections. They sometimes employed a molder of large experience, and members requiring advice paid him for it at a rebate on fixed charges. In that way small consumers derived much benefit from the associations not otherwise available to them. If the membership of this association will combine and carry out a line of investigation it would prove very beneficial to all, and would result in information not open to individual members.

Mr. Wanner had no doubt the executive committee would be glad if the association would give the subject some thought. To have some one in the interests of the Foundrymen's Association to whom members with business large or small could turn for information was an idea worth following out. He supposed it would require something in addition to the ordinary fees of members to attain this end, but as one of the executive committee he should be glad to see what could be done.

After much discussion the matter was referred to the executive committee.

Mr. Wanner then stated that the Chamber of Commerce in New York, at a sitting that afternoon, had taken action in favor of the repeal of the silver bill. A resolution, he said, was also passed that all boards of trade, industrial and commercial associations be asked or requested to take up the matter and express their views on the subject. He was of the opinion that the Foundrymen's Association had secured a very good foothold, and he saw no reason why its members should wait until they were asked to act in the matter, or why they could not to some extent, take the lead in that direction. He thought they should help the matter along. Doubtless, all were rejoiced to know that Congress would meet in August, instead of September. It was obvious that they were passing through a crisis which had already hurt a good many of them, and the end had, possibly, not yet been reached. The general opinion prevailing appeared to be that the Sherman silver law was a bad law, and had induced the present condition of financial affairs, and, therefore, the sooner it was repealed the better it would be for all. He submitted the following resolution:

Resolved—as the sense of this Association—That we respectfully urge upon Congress, when assembled, the immediate and unconditional repeal of the silver-purchasing clause of the Sherman act.

After some discussion, the resolution was put to the meeting and carried unanimously.

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Mr. Henderson, in reply, said that a chemist could make any grade of iron desired, accidents excluded. The question of shrinkage was the main question a foundryman had to deal with. If the melting point of wrought-iron was compared with the melting point of cast iron there would be found a marked difference in the number of degrees of heat necessary for the melting. It should first be ascertained what occasioned that tremendous difference, and a chemical analysis would reveal the fact that one was almost pure iron, while the other contained what might be termed impurities. It was fair to suppose that the impurities were the cause of the change in the melting point. Certain impurities were found to be deleterious—such, for instance, as maganese, sulphur and others. In fact they would be objectionable unless handled with great care. Silicon had the effect of correcting shrinkage, for the reason that it had been ascertained that the purer the iron the greater the amouut of heat required to melt it. It was a natural law that all bodies contract on cooling and expand on heating, consequently the greater the heat the greater the expansion. The farther apart the atoms of metal get when in a melted state the greater distance they had to come together in cooling. This was shrinkage. If the temterature of the metal could be reduced to the smallest possible degree and the metal held in fluidity, then would be reached the highest point from which shrinkage was to be ascertained, and in consequence the chemist selects an addition to the mixture considered to be the least deleterious to effect a reduction in the melting point of his metal. If he goes too far and uses too much silicon he causes the article manufactured to be extremely brittle. Silicon has a tendency, when existing in high proportions, to make an article of low tensile strength, therefore it is necessary to know how far to go when using it.

P. D. Wanner thought that it was generally believed that the pig-iron of the present day was not as good as it was ten or fifteen years ago. That was the opinion prevailing at Reading. Producers were careless as to the quality of ore melted, and were forcing their furnaces with the object of turning out as large a quantity as possible, without regard to

quality, on account of the low prices current. This being the case, it became more important for the foundryman to mix his iron, or to get to understand his iron so as to bring about good results. Silicon was very necessary in the iron used for making pipe, particularly in the larger sizes, so as to prevent undue shrinkage, and it could not be dispensed with. Iron possessing a good deal of that element was required. Too much caused the pipe to become brittle and thus entail a great deal of trouble, as he knew by experience. He had had trouble with a certain brand of iron which ran hard and white. He would like to know what was wanting in that case.

Several things, Mr. Henderson said, would cause iron to run white, sulphur having a remarkable effect. Sudden cooling would also cause the condition. It was likely, too, that the iron was low in graphitic carbon and high in combined carbon. Change in the temperature in melting when the iron contained a small amount of graphitic carbon would cause it to run white.

Mr. Wanner presumed that in order to meet the case it would be necessary to add another iron to the mixture sufficient to supply the deficiency existing.

Stanley G. Flagg, Jr., said that he had long intended to raise the question among members of the association as to whether it would be practical or possible for the association to go more fully into the technical part of the foundry business. He could not imagine a man melting a small heat of iron affording to employ a chemist. In Germany, foundrymen's associations such as this have technical connections. They sometimes employed a molder of large experience, and members requiring advice paid him for it at a rebate on fixed charges. In that way small consumers derived much benefit from the associations not otherwise available to them. If the membership of this association will combine and carry out a line of investigation it would prove very beneficial to all, and would result in information not open to individual members.

Mr. Wanner had no doubt the executive committee would be glad if the association would give the subject some thought. To have some one in the interests of the Foundrymen's Association to whom members with business large or small could turn for information was an idea worth following out. He supposed it would require something in addition to the ordinary fees of members to attain this end, but as one of the executive committee he should be glad to see what could be done.

After much discussion the matter was referred to the executive committee.

Mr. Wanner then stated that the Chamber of Commerce in New York, at a sitting that afternoon, had taken action in favor of the repeal of the silver bill. A resolution, he said, was also passed that all boards of trade, industrial and commercial associations be asked or requested to take up the matter and express their views on the subject. He was of the opinion that the Foundrymen's Association had secured a very good foothold, and he saw no reason why its members should wait until they were asked to act in the matter, or why they could not to some extent, take the lead in that direction. He thought they should help the matter along. Doubtless, all were rejoiced to know that Congress would meet in August, instead of September. It was obvious that they were passing through a crisis which had already hurt a good many of them, and the end had, possibly, not yet been reached. The general opinion prevailing appeared to be that the Sherman silver law was a bad law, and had induced the present condition of financial affairs, and, therefore, the sooner it was repealed the better it would be for all. He submitted the following resolution:

Resolved—as the sense of this Association—That we respectfully urge upon Congress, when assembled, the immediate and unconditional repeal of the silver-purchasing clause of the Sherman act.

After some discussion, the resolution was put to the meeting and carried unanimously.

A motion was then made that the resolution be sent to the Speaker of the House under the seal of the association and the signature of the authorized officers.

The secretary, Howard Evans, announced that the Western Foundrymen's Association held their first meeting in Chicago on May 25th last. The association was permanently formed, and has followed very closely the proceedings of this association. In regard to the circular sent to them inviting discussions and comparisons on subjects of interest to foundrymen in general, he was advised that the new association would be carried on separately and on its own basis, but would feel itself in touch with this association, and be perfectly willing to send information on any subject which it was in their power to give. He had written their secretary stating that this association was national in character, and both willing and anxious to help any association in the United States, with the idea of furthering the interests of the foundry trade. If, after a time, all the associations were found to proceed satisfactorily it might be found desirable to have a meeting on a large scale.

The meeting then adjourned.

"STICK YOUR FOOT OUT"

Said a Bride in the Sleeper when She Wanted to Find Her Berth.

THE conductor of the Chicago & West Michigan flyer told a good story while his engine was taking water at St. Joseph, Mich., recently.

At Grand Rapids a newly married couple got on the train, and the two sat up the greater part of the evening, talking love. Finally they retired. After a while the bride got up to get a drink. She said to her husband:

"Dear, I'm going to get a drink. When you hear me coming back, stick your foot out of the berth so that I won't make a mistake."

When she returned every berth had a foot exposed.

The views of Herbert Spencer on Private Relief of the Poor, are contained in an incisive article, which appeared in the July Popular Science Monthly.

The Griffin Wheel Company, of Chicago, has been organized by Thomas A. Griffin and others for the manufacture of car wheels, etc.

The strike of the molders at the Clinton Foundry, Troy, N. Y., has been declared off, and the men have returned to work. It is understood that mutually satisfactory arrangements have been made between the management and the employees.

The Moore Manufacturing and Foundry Company, of Milwaukee, manufacturers of hoisting machinery and hardware specialties, have shut down, throwing out 225 men. They intend to resume as soon as orders use up some of their accumulated stock.

The Thomas-Roberts-Stevenson Co. of Philadelphia, stove manufacturers, have contracted for the erection of a one-story brick foundry, 47x100 feet, and a three-story brick storage house, 33x66 feet, as an addition to their plant at Second and Mifflin streets.

The silver statue of Columbus for the World's Fair, designed by Bertholdi, was successfully cast at the works of the Gorham Manufacturing Company, at Elmwood, Mass., last week. The statue is slightly larger than life size. Nearly a ton of metal was employed in its casting, the value of the silver being estimated at about $25,000.

The Teeter Molding Machine Company, of Indianapolis, Ind., manufacturers of molding machines for general purposes, have decided to add a line of pulley molding machines to their business, and have some building now that possess some original features, and which we think will fill the preverbial want in this direction.

At Schenctady, N. Y., William B. Turner's new Bellevue Foundry and Machine Works will be in operation in another month. A double frame, two-story structure, 75x116 feet has been erected. The floor space of the foundry is 98x113 feet. There will be manufactured iron castings of all kinds, together with Mr. Turner's compression coupling.

PEERLESS FACING MILLS

CHICAGO FOUNDRY SUPPLY COMPANY

MANUFACTURERS OF

Foundry Facings, Supplies and Foundry Equipments.

IMPORTERS AND REFINERS OF EAST INDIA PLUMBAGO AND EAST INDIA SILVER LEAD.

SHIPPERS OF ALL KINDS OF MOULDING SANDS, FIRE BRICK, CUPOLA BLOCKS, FIRE CLAY, ETC.

Our Specialties: Fine Stove Plate and Machinery Facings.

18th and Rockwell Streets and C., B. & Q. R. R.

Chicago, April 7, 1893.

Mr John A. Penton.

"THE FOUNDRY"

Detroit, Mich.

Dear Sir:-

We received three orders in one day last week, one of which came from England, for all of which we thank "The Foundry"--to which they are directly traceable.

About a week ago we purchased the Keystone Facing Mills at Irwin Station, Pa., and are purchasing additional machinery and otherwise enlarging the plant, which will give us increased facilities in that section.

With best wishes, I remain,

Very respectfully yours,

J. Obermayer Co

Success in advertising lies almost entirely in knowing how to do it.

It would be foolish to advertise anchors or sails in a Druggist's Journal or to advertise silk goods in a Hardware Magazine. It has been discovered after some costly experiments on the part of many advertisers, that the way to reach the foundry trade is through the columns of THE FOUNDRY. Those who have tried this have always been well pleased, and there are some who have been honest and fair enough to say so.

The above is a representation of a letter on file in this office, and those who know the concern or the gentlemen signing it, will appreciate the fact that there must have been some good evidence to back it up or we would not have received it.

AN ORNAMENTAL IRON PLATE.

AS a sample of the molder's art that is useful as well as ornamental, we present our readers this month a photo-engraving of a card plate, made at the foundry of the Yale & Towne Manufacturing Company, Stamford, Conn., where they make a specialty of ornamental iron work. The pattern from which it was cast was secured many years ago by Mr. Towne, in Glasgow, and is similar to one the writer knows of which is said to be at least sixty years old.

It is exceedingly ornate, the design being both delicate and rich, and as the casting seems to be most perfect, it reflects credit upon an establishment noted already for its nice work. One curious feature about this casting is that there are two of them in the Russian exhibit in the Mining Building, referred to elsewhere, thus showing that its beauties were appreciated by even far away Russian iron foundries.

The Yale & Towne Co'y. have these plates in two sizes, 6½ and 9 in. in diameter, and it was from these patterns that they made the plates presented to the Western Foundrymen's Association.

THE Walker Foundry Company, of Erie, Pa., capital stock, $25,000, has been chartered for the manufacture of iron, steel, etc. B. A. Waker, of Erie, is connected.

THE Marshall Fonndry aud Construction Company shipped to the Homestead Steel Works, recently, what is said to be the largest ingot molder that was ever cast in a flask size. It was 27x82x130 inches. It is to be used for armor plate. Its weight is 5,800 pounds.

A SIMULTANEOUS REPLY.

THE six-year-old son of a family living on Seventy-second Street was informed the other morning that the rector was expected to call in the afternoon. After luncheon the mother began to coach him in his catechism, his name, age, etc.

"He will ask your name," she said, "and you must tell him, 'Frankie Jones.' Then he will ask your age, and you must say, 'six years old in June.' He will ask you who made you, and you must say 'God;' and then if he asks what He made you out of, you must say 'Dirt.'"

The rector came, and, sure enough, he asked the little fellow his name, whereupon Frankie shouted: "Frankie Jones, six years in June, God, dirt!" all in one breath.—*New York Times.*

PART of the immense new foundry being constructed at the Edgar Thomson Steel Works, at Braddock, Pa., was put in operation during the past month several molds having since been successfully cast. The entire plant, covering six acres of ground, will be operated by electricity, giving employment to a large number of men.

STEARNS, ROGERS & Co. are making some extensive improvements to their foundry and machine shop at Pueblo, Col.

R. D. WOOD & Co, of Philadelphia, Pa., show the largest cast iron pipe at the Fair in the central position of Machinery Hall. It is 72 inches in diameter. This firm also makes a fine display of powerful hydraulic riveting machines, and hydraulic punches and shears. They show much which will be of interest to boiler makers, bridge builders and other heavy iron workers.

HENRY CRIBBEN.

MR. HENRY CRIBBEN, the subject of this brief sketch, was born in the Isle of Man, Great Britain, in the year 1833. He accompanied his parents to this country when he was about four years of age, and immediately took what advantage was to be secured in the common school system of Rochester, N. Y., where the family located for a few brief years, until he became apprenticed in the trade of iron molding.

He has always been one of those who believed if a thing is worth doing it is worth doing *well*, and this maxim is one which has governed his course through a long and well spent career, which all those who know him hope has many a league yet to run.

Through close application he became thoroughly acquainted with every detail of the stove molder's profession, and shortly after he had graduated as master workman the war of the rebellion broke out.

He joined the army in 1862, enlisting as a private in the 140th New York volunteers, and participating in all the important battles of the Army of the Potomac up to the time of his capture, June 2, 1864. Mr. Cribben's regiment was one that made a record probably second to none in the army of the North, and to whose tenacity on the second day of Gettysburg's fateful three days fight, is due the capture and retention of Little Round Top, one of the most important of the strategic points of that blood-stained field, and no one connected with the

HENRY CRIBBEN.

140th did more to maintain its prestege and credit than did Mr. Cribben. At a minor engagement at Bethesda Church in June, 1864, he was captured on a skirmish line which was left by Gen. Grant for sacrifice in his historic move to the left of Cold Harbor in his attempt to flank the opposing army of Gen. Lee. Mr. Cribben laid in prison at Richmond, Va., Macon and Savannah, Ga., and Charleston and Columbia, S. C., for eight months and made his escape from near the latter place, with two others, on the 11th day of February, 1865, while being transported with other prisoners from that point to another rebel prison further north. After five weeks of as tough experience as was known to the few northern soldiers who escaped from the clutches of the Confederates, and after having passed through many episodes and dangers, being assisted frequently by friendly negroes, who concealed him during the day and piloted him during the long hours of the night, he reached the Union lines at Vedder's Mills, Tenn., on the 15th day of March. Mr. Cribben rejoined his regiment forthwith and served out his time with it until the termination of the war, and finally reached home, having been promoted, by well earned stages, to the rank of captain. He laid down the sword and took up the pruning hook—or, more literally, the molder's rammer—and exchanged the occupation of soldier for that of peaceful artizan.

Mr. Cribben was one of the first presidents of the Iron Molders' Union No. 12, of Rochester, N. Y., and one of the charter members of the national organization, and to his efforts, and a few other leading molders throughout the country, may be attributed the construction of that institution. He was enthusiastic in all matters connected with the Iron Molders' Union, the Trades Assembly, and the interest of labor in general, although all those who are familiar with his career are prompt to concede that he was invariably outspoken in the cause of right, whether in any particular instance the immediate interest of the employer or the employee was to be favored or injured by the result of the decision.

One of Mr. Cribbin's associates of earlier days, who was a molder at the time he was, recently said: "Mr. Cribbin was always opposed to strikes when they could be avoided, and always preferred to meet his employer who might be disposed to do anything like justice to his men more than half way, fully believing that anything that might be accomplished voluntarily on the part of the employer would prove a permanent benefit; whereas strikes, although successful, would react upon the employees when the opportunity was offered to the employer."

Mr. Cribben has expressed himself both in and out of the National Stove Association as a firm believer that education and practical cooperation honestly applied is the proper solution of the labor question. He has advocated this, and by putting it into practice in Rochester and Chicago has demonstrated the force of his argument. In a future issue of THE FOUNDRY we will give our readers an opportunity to judge of the practicability of Mr. Cribben's views, as outlined by himself, together with a brief acccount of his own experience in putting them to the test.

He was elected to the legislature of New York state in the year 1866, and declined subsequent nomination for that and other offices, feeling that he had had his share in political as well as military glory.

The Co-operative Foundry Company of Rochester, so well known to the trade throughout the northern, eastern and western states, was organized and incorporated through the efforts of Mr. Cribben in greatest part, ably seconded by those of its president, Mr. N. Brayer. To all whose lot it has fallen in later days to assist in conducting the affairs of the Co-operative Foundry, it has been plain that the principles of thrift and energy and honesty of purpose which were instilled into the enterprise in its youth have been the elements which have made the full grown tree, throughout the twenty-six years of its existence, bring forth good fruit.

Although not severing his connection with the Co-operative Foundry company entirely, continuing in the board of directors up to the present time, he went to Chicago in 1872 and purchased a branch house, which was then being conducted in that city by the Home Company. He united himself there with Mr. Jas. A. Sexton, the well known and genial postmaster of Chicago, and has continued since then in the same line of business, having purchased and equipped a foundry which has grown to be one of the largest in the west.

The life of Mr. Cribben has been a varied one. He has experienced more of the vicissitudes of an earthly career than often falls to mortal lot. The competence which he enjoys, the influence at his command, the esteem and respect in which he is held by his friends and

acquaintances, has been secured by such honorable methods as alone can bring the highest estimatoin of one's fellow men.

Mr. Cribben was the first president of the Stove Founders' National Defense Association of Stove Manufacturers, and has continued through seven suscessive terms and into the eighth, although it is but fair to him to state that he has continued in this last mentioned office only on the absolute and unanimous demand of those who formed the membership of the organization. Even those whose acquaintance with that gentleman has been confined entirely within the limits of the Defense Association, have felt that while he was persistent and uuflinching in his demand that the employer should be conceded the full measure of justice and control of his own business, he has been equally tenacious in favor of granting everything that consistently could be granted to the employee, and oft defending the well established maxim that "the laborer is worthy of his hire."

The results which Mr. Cribben has attained are not peculiar to his own instance only. There are other members of the Association whose lives furnish equally profitable illustrations of the fact that what has been done can readily be done again, and any young man with equally good purpose and unflinching determination can reach the prominence which some of the present great employers of labor have attained. No man connected with the National or Defense Association has made a better example for emulation of those who will soon follow in our footsteps than Mr. Henry Cribben, of Chicago, Ill.

MESSRS. BYRAM & COMPANY, Detroit, Mich., have just shipped the second Colliau Cupola Furnace to the Marietta Hollow-Ware and Enameling Company, Marietta, Pa.; one to the Wilbraham-Baker Blower Co., Trenton Junction, N. J.; two to the Hydraulic Machine Works, Pittsburg, Pa.; 1 to the United States Navy Yard, Mare Island, Cal., and one for the Connersville Blower Company, Connersville, Ind.

Mr. John Taylor, who has been with the American Foundry Company, Tacoma, Wash., for the past three years, has taken charge of a foundry in Walla-Walla, Wash.

Mr. Joseph Johnson has accepted the foremanship of the Puget Sound Dry Dock Company, Tacoma, Wash. This firm makes a specialty of marine jobbing work.

Questions and Answers.

"C. G. M." desires to know the name and address of any manufacturer of oil that can be used as a substitute for linseed oil in making cores.

"E. H." asks what effect has the use of salt water—such as sea water—upon the loam, dry sand and green sand molds in foundries that have used it for wetting sand, mixing loam, etc. How would a loam mold be affected that had been mixed with salt water, and what effect it would have upon the casting?

A MODEL JUROR.

COUNSEL (to talesman)—Have you any knowledge of anything in this world or the world to come?

Talesman—I have not.

Counsel—Do you know enough to come in out of the rain?

Talesman—I do not.

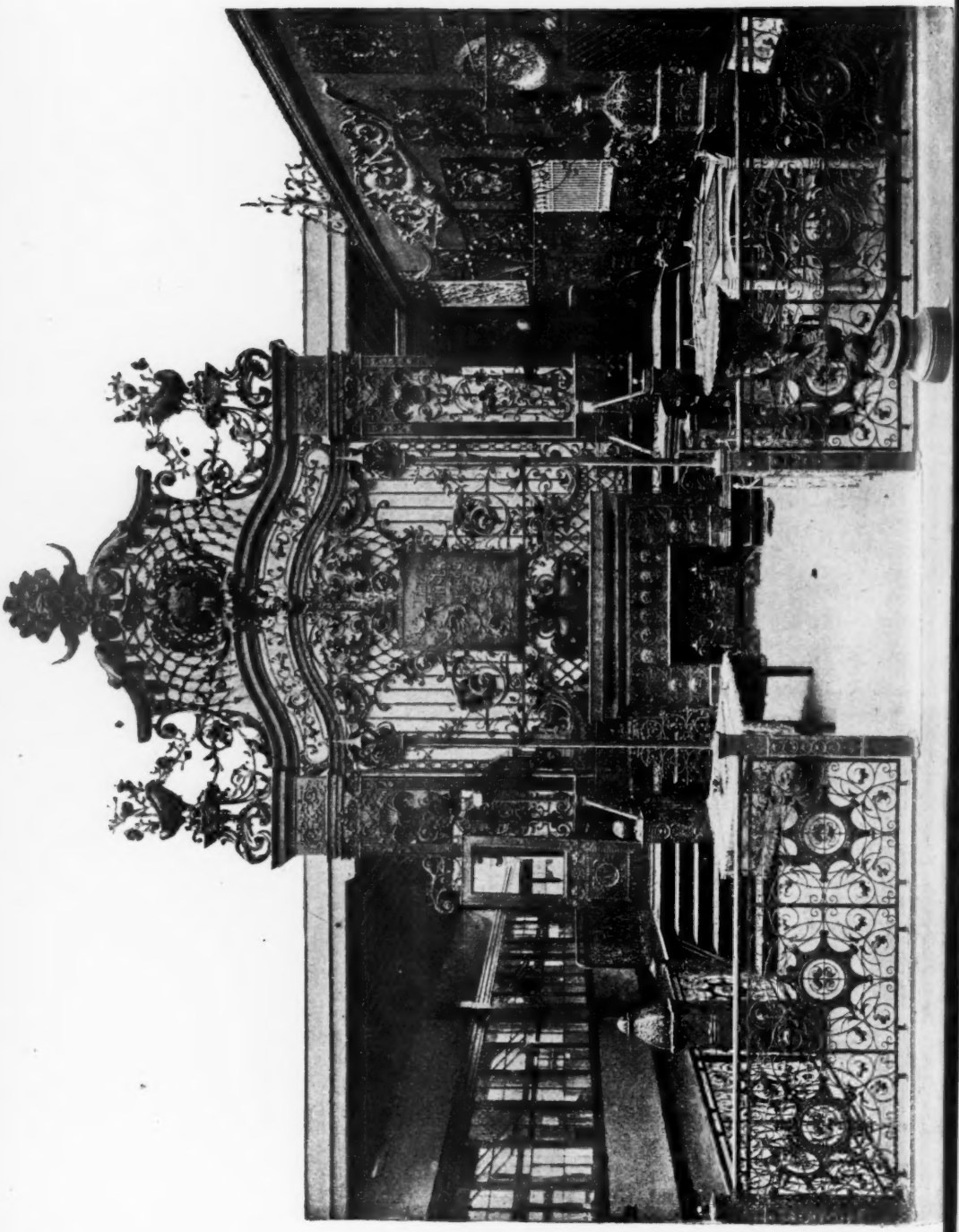
Counsel—If you were standing on a railroad track, and an express train approached at a speed of ninety miles an hour, would you step out of the way?

Talesman—I would not.

Chorus of lawyers—Step right into the jury box.—*Puck.*

THE Carnegie Steel Company (Limited), has placed an order with the Yale & Towne Manufacturing Company, of Stamford, Conn., through its Pittsburg representative, F. G. Tallman, for 11 10-ton 3-motor electric traveling cranes. These cranes are to be used at the Homestead Steel Works, in taking beams from the cooling tables and distributing and loading them on cars ready for shipment. They will be used out of doors, unprotected from the weather. This order is said to be the largest single order ever placed for electric travelers, and it is also said to be the heaviest endorsement of electric traveling cranes for any specific purpose in and about steel mills.

THE Bailey Foundyy, at Elkland, Pa., has been leased for a term of years to H. Longwell & Sons, who will manufacture a drill patented by the senior member of the firm.



Winslow Bros. Exhibit at The Fair.

WINSLOW BROS'. EXHIBIT AT THE FAIR.

ON the pereceding page appears an illustration of the exhibit at the Fair of the Winslow Bros. Company, Chicago, manufacturers of every description of ornamental, cast, and wrought iron work. The engraving, which is a fairly good one considering all the circumstances, but faintly suggests all the beauties of the many really handsome pieces of work that the exhibit contains. The castings are, many of them, bower-barffed, and made by the galvano-plastic process, which permits of very great perfection of detail, both in design and workmanship.

NOTES AND COMMENTS.

As we have nothing very encouraging to report concerning the present condition of the iron trade, we will do the next best thing and *say nothing* further than to quote a remark made in our presence a few days ago, viz: "That business all along the line is so flat on its back that it cannot help looking up."

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The quarreling and squabbling that has made the various commissioners in charge of the Columbian Exhibition famous, keeps up without missing a stroke or slipping a cog. The board of lady managers, however, seem to be carrying off the honors thus far, judging from the press reports of some of their hysterical sessions.

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The country has really something to fear in this emergency from its politicians—men who are simply in Congress because they think they represent a certain party in their locality, instead of the whole district, and who will attempt to make political capital out of the present situation. The less there is of that the better just now, as the country is in no condition for such trifling. It is Statesmanship, not Partisanship, that in this emergency is demanded by our representatives; charges and recriminations as to the origin of the situation are out of place, and the patriotic man will have no time to indulge in them.

EXCHANGES, BOOKS, CATALOGUES, ETC.

J. W. Paxson & Co., Philadelphia, Pa., are mailing a neat Catalogue of a few of their leading foundry equipments to their friends. Besides the wide range of articles usually coming under this head, they have several new appliances, etc., which ought to find a place in every well-conducted foundry, such as wire straighteners, sprue cutters, Millett's core oven, pattern lifters, adjustable clamps, drying stoves, etc.

"Ornamental Iron" is the title of a very handsome publication which has made its appearance with a view of treating extensively the subject of ornamental cast and wrought iron. It is quarto in size, profusely illustrated, printed on heavy and finely printed paper, and contains a great deal of matter that is of the very greatest interest to foundrymen everywhere. Subscription price, $2.00 per year. Address, "Ornamental Iron," 761 Rookery Building, Chicago, Ill.

The Co-operative Foundry Co., Rochester, N. Y., send us their Catalogue for '93-'94. To look through and carefully study a Catalogue like this seems to be an education in itself on the stove subject, and shows what a really remarkable improvement has taken place in the last few years. Judging from the illustrations, the explanations given and claims made, etc., on behalf of the Red Cross Stoves made by this company, it would appear that really nothing is left to be desired by the owner of them.

The B. F. Sturtevant Co., Boston, Mass., have printed the third edition of 10,000 copies of their 200 pp. General Catalogue (No. 61), which describes the uses of their Blowers, Exhausters, Engines, Forges and Heating and Ventilating Apparatus, and they desire to place a copy in the office of every Superintendent, Purchasing Agent, Engineer, or Manufacturer using such machinery. All who have not received a copy will confer a favor by applying at once to the above address. It will be mailed free of charge.

WESTERN FOUNDRYMEN'S ASSOCIATION.

THE regular monthly meeting of the Western Foundrymen's Association convened Wednesday evening, July 19, 1893, at 225 Dearborn street, Chicago, Ill.

Mr. A. T. Whiting was elected temporary chairman.

The minutes of the last meeting were read and accepted.

The treasurer's report was also read and accepted.

The following report was offered by the committee appointed by the chair to investigate the offer made by the Armour Institute:

CHICAGO, July 19, 1893.

To the Western Foundrymen's Association, Chicago, Ill.

GENTLEMEN:—Your committee appointed to investigate the offer of the Armour Institute to do the chemical and physical testing of the Association has to report that they visited the Institute and investigated their facilities for doing the work. At present they have no apparatus, but say that they will put in whatever is necessary to do the work in a satisfactory manner, but they cannot present any figures as to the cost of doing the work until they know about how much there is to be done. After a decision is reached by the Association as to whether they want go into any arrangement with a chemist, and an approximate idea is given them as to what amount of work there is to do, the Armour Institute will submit a proposition.

Yours very truly,

(Signed) F. A. WIGHAM,
B. M. GARDNER,
A. T. WHITING,
Committee.

ELECTION OF OFFICERS.

Mr. George M. Sargent, of Sargent & Co., Chicago, and Mr. Charles Allis, of The E. P. Allis Company, Milwaukee, were nominated as candidates for the vacancy made by the resignation of Mr. C. A. Plamondon.

The secretary was instructed to notify the members of the Association of the nominations made to be voted upon at the next regular meeting.

NEW MEMBERS.

The following members were received into the Association:

Brown Brothers Manufacturing Company, Rogers, Brown & Merwin, David Van Alstine and Jas. A. Gilbert (of Sargent & Co.), Chicago, Ill.; Charles Bruner, Peru, Ill.; Challenge Wind Mill and Feed Mill Company, Batavia, Ill.; L. L. Graves, Streator, Ill.; A. L. Ide & Son, Springfield, Ill.; The J. D. Smith Foundry Supply Company, Cincinnati, O.

THE CHEMIST AS A FACTOR IN FOUNDRY PRACTICE.

BY H. O. CHUTE.

Since this paper was asked for by the executive committee, several articles on the same subject have appeared in the technical press, and the able address given before the Eastern association by Mr. Wm. C. Henderson entitled "The Value of the Chemist's Service as Applied to Foundry Practice," which you have all doubtless read, treats the subject so thoroughly and so well that the writer of the present article decided to confine himself to a few remarks on the possible methods by which the chemists should be utilized in the foundry, feeling that all are now alive to his value and importance. To do this, a short description of the chemist's methods of work in a Bessemer steel works will be given, as illustrating a parallel manufacture and one in which the services of chemistry have been brought to the highest perfection.

With the advent of the Bessemer converter the chemist became a necessity, as its processes could never have been brought to this present perfection without its aid.

Previous to this time all branches of the metallurgy of iron were supposed to be mysterious secrets, known only to a few who had inherited in some way this knowledge from their ancestors, and who by long experience had a kind of intuition as to the hidden causes of success or failure. If failure attended one effort, the only escape was by guessing the cause and experimenting to find some way to avoid the difficulty. This condition led to extreme conservatism, and the safest plan was to stick by a material and method which was known by experience to give satisfactory results. Expansion, development and improvement were prevented by the

impossibility of predicting beforehand the result of a costly undertaking.

Now, however, the causes of the seemingly mysterious differences in iron and steel have been traced to the different elements contained therein, and which on account of their small quantity had been previously overlooked. This knowledge has enabled the manufacture of steel to be brought to a strictly scientific basis, and knowing exactly what is wanted, iron is bought on chemical specifications, and immediately on receipt of material it is tested by the chemist. This test shows exactly its quality, and the user then settles for it and knows without a doubt exactly its suitability for the required purpose; no "trial carloads" are necessary, and disputes as to quality are impossible.

When the metal is blown in the converter, another change takes place, and its amount and extent are determined by more chemical tests. The steel being a final product, is tested mechanically by hammering, bending, etc., and any fault revealed immediately requires investigation by the chemist to determine its cause. It will thus be seen how closely the chemist is associated with every operation, how every action is watched and studied at the converter's mouth, how all the causes of success and failure are discovered by analyzing all the materials, and all the products all the way through, and analyzing the effect of all the elements on the reactions which takes place in its manufacture.

WHAT CHEMISTRY DOES FOR THE STEEL MAKER.

The possibility of determining beforehand and without costly experiment the suitability of material for certain purposes by knowing its chemical composition, has enabled the manufacturer of steel to select from the widest possible range of raw materials the most advantageous, has enabled him to secure uniform results and to show the way to economies which have tended to cheapen the product, enabling him to supplant largely the manufacture of wrought iron and even to threaten the field of the iron casting.

The chemist at the steel works soon necessitated a chemical supervision of the blast furnace, if the pig iron was to be always of the desired composition. This practice soon showed great advantage over the previous imperfect methods, and while furnaces making Bessemer pig iron have a chemist from necessity many of the furnaces running on foundry iron pay strict attention to the composition of their ores, flues, fuels, etc., because of the superior results gained thereby, and it may be said today that the furnaces are ready to furnish anything desired by the foundry.

But why, asks the foundryman, if this is the case, do not the furnaces supply us with an iron exactly suited to our uses and thus avoid any necessity on our part for taking up this troublesome question? To answer this, and to throw some light on the causes of variations in iron from different localities, it will be necessary to examine into the condititions which surround the blast furnaces.

VARYING BLAST FURNACE CONDITIONS.

To the furnace accessible to the Lake Superior region an unlimited assortment of the richest ores are always available. But these are hauled a long distance and by the time they are laid down at the furnace are expensive.

The advantages of a rich ore lies in the less freight per ton of iron made, the less amount of fuel used, and the increased capacity of the furnace. Its disadvantages lie in the greater cost per unit of iron, and the probability that it will produce an iron lacking in silicon, and hence one that will not carry much scrap and will not correct chill or shrinkage. The other elements of lake ores, such as manganese, sulphur and phosphorus, are usually not in sufficient quantity to effect the pig iron materially.

The furnaces near the Connellsville coke have a cheap fuel, relatively free from sulphur, and some local silicious ores and cinder. By mixing these with Lake ores are producing the irons known as Ohio soft irons and American Scotch. These are well known as being soft and strong irons, which is due to their being free from excessive amounts of sulphur,

phosphorus and manganese, and having rather large quantities of silicon.

The furnaces of the South have to deal with an ore which is silicious and carries relatively large quantities of phosphorus, and a coke which usually carries more sulphur than the Connellsville. Here, having cheap ores, fluxes and fuel, and cheap labor, they are enabled to run on a lean ore, and by using more coke and flux, and keeping the furnace hot, produce an iron high in silicon and known as a soft iron and a scrap carrier, but on account of its percentage of phosphorus, not very strong.

The furnaces, producing "local coke foundry," having high freight rates to pay on ore and fuel, use a rich ore, and with a low fuel consumption and a great capacity, make an iron strong on account of its freedom from sulphur and phosphorus, but on account of its relatively low silicon not noted as a scrap carrier.

Lake Superior charcoal being made from a pure fuel and from especially selected ores, gives an iron particularly free from phosphorus, sulphur and silicon, and on account of its purity, being very strong, and its tendency to chill gives it great value in particular lines.

It will thus be seen that there are economic reasons for the production of different kinds of iron in different localities, and that to use them to the best advantage an intelligent mixing will be required. But the characteristics of iron from different localities are not always constant, differing not only with particular furnaces, but by the particular conditions at the furnaces at the time of making.

DIVORCE OF FURNACE AND FOUNDRY.

The impossibility of always making an iron suitable for a particular purpose and of knowing what kind of iron would run from the furnace until it was cooled and examined, led to the divorce of the furnace from the foundry business, the two businesses being formerly combined, as is shown by the fact that the superintendent of the furnace is yet called the founder.

To correct a fault of any particular iron, the particular iron must be singled out, the cause of its failure determined from lack or excess of a particular element, and thus remedied by the addition of another iron having a relative excess or deficiency of the same element.

To experiment with the cupola mix till the cause is determined is both tedious and expensive, for with six or more irons containing six varying proportions of six elements, the number of combinations which may be made before the right one is found offers a very inviting field for the calculations of the mathematician, but their contemplation very often wearies the founder.

The analysis of the casting here immediately locates the cause of the trouble, and knowledge of the composition of the irons in the mix allows the offender to be singled out, and points the remedy at the same time.

HOW AN ASSOCIATION CAN BE OF HELP.

Heretofore the majority of founders have considered that the extent of their business did not warrant their employing the services of a chemist, but the present Association offers a great opportunity for mutual aid in this direction by their having a laboratory for their special use, where there would always be the facilities for their individual work, where they could always consult with a specialist on the problems which are always arising, and where work of general value and interest to the trade could always be carried on, and the knowledge distributed through the society.

Some of the large foundries have already availed themselves of the services of a laboratory, and the results in all cases have been most satisfactory, although for business reasons there would naturally be no great disposition among them to herald its advantages, but some of the notable advances of late, both in improvement of quality and cheapening of product, are directly traceable to this cause.

POINTS AS TO PHYSICAL TESTS.

To avail himself of the advantages of chemistry, it will be necessary for each founder to determine, first, just what physical qualities are required for his special line of work. This will involve

physical tests, and on this subject let the following be quoted: "It must be obvious to all that the actual service to which an article is put when occupying the position for which it was made is the best conceivable test, and as the chemist's knowledge has, in the first place, been derived from, and his sole aim is, in the last place, to meet this test, it might be said that he is wholly independent of tests other than chemical ones. The very utmost which can be hoped from such tests is to determine whether a certain lot of material is good or bad." It may be also remarked in this connection that the founder knows pretty well what he wants in this respect, the main problem being the best and cheapest method of getting it.

The writer wishes to throw no discredit on any physical tests, recognizing their value from a scientific standpoint and in connection with chemical analysis. But of what use is an elaborate system of physical tests alone which reveal nothing for future guidance? If the product is thus tested, it reveals nothing as to where the error lies in the mixture; and if the different irons are thus treated, besides the error caused by dissimilar treatment, from what would be received in the cupola, there must always be made the false assumption that the physical qualities of an iron would always be transferred to the mixture, the fallacy of which is easily shown by melting a ferro-silicon and white iron together, both being hard and brittle, and obtaining a very soft casting as the result.

As to what chemical compositions will give the best results, the requisites are so varied, depending on the uses to which an article is to be put, that probably the easiest way is to select some of the best and some of the worst specimens, and by analysis determine what elements are required and what to avoid. With these factors determined once for all, there remains the constant attention that is necessary to always know what elements, and their proportions, are in stock, and the ever varying factors of the composition of fuel, the effect of treatment, and others which will constantly arise.

Another thing essential is for the founder and the chemist to get better acquainted and understand each other better. The founder is liable to regard the chemist as an upstart who tries to teach him his business. The chemist is apt to forget that he deals with but one of the numerous factors which are necessary in the production of good castings, and that without the practical knowledge of the founder as to the handling of the iron, the running of the cupola and the other things necessary in the foundry, the knowledge of the chemistry is of no avail. But in this day of specialists, it may be conceded that more than one man is necessary to make the best castings.

THE ADVANTAGES.

Finally comes the question, "Will it pay?" The certainty of getting just what is wanted, or the ability to use anything which is offered cheap without costly experiment, must count for something; and the freedom from attachment to some brands or names, which is now paid for at 25 cents to $1 per ton, will be somewhat of a compensation.

The lessening of the amount of spoiled castings might also be enumerated. And finally, the broadening field for the iron casting, through the improvement in quality and uniformity of products, which field seems at present to be narrowing, will be of such vast advantage to the trade that the wonder will be expressed that the advantages were not embraced sooner.

Several gentlemen took part in the discussion which took place immediately after this paper was read, among them being Mr. N. B. Rising, Berkely, Cal., who stated that the subjects therein were entirely new in that part of the country. Mr. J. H. Warden approved of the article, and thought it contained much good material, concluding with the wish that he hoped the Association would make satisfactory arrangements with the Armour Institute for securing such analysis as they might desire. Mr. Geo. H. Ellis said he came to listen and not to talk and would like to learn more on this subject, as far as it might

have reference to the malleable iron foundry. Mr. A. M. Thompson said a few words in praise of the work the Association was doing. Mr. J. P. Gilbert gave his experience of the benefits to be derived from a laboratory in connection with a steel plant, and spoke of the avantages to be derived by keeping close track of things in the iron foundry. Mr. Wigham thought that Mr. Chute's paper contained much room for discussion and argument, but felt that more time should be given before a summary disposal of the subject, and would like to ask Mr. Chute some questions at the next meeting, which was agreed to. Mr. Cook, of the Armour Institute, spoke at length of the work that they proposed doing and that they would like to do in connection with the Western Foundrymen's Association.

A letter was read from Dr. Haupt, of the Armour Institute, regretting his inability to be present, and Mr. Penton resumed the discussion by speaking in the highest terms of the paper which had just been read.

Propositions were received from H. A. Chute, from the University of Wisconsin, and from H. L. Hollis & Company, Analytical Chemists and Mining Engineers, to attend to the chemical and physical analysis of any of the materials that might be submitted by members of the Association, and were referred to the members of the Executive Committee.

Mr. Penton presented the Association, on behalf of the Yale & Towne Manufacturing Company, of Stamford, Conn., with four ornamental castings, two of them being Bower-Barffed, and two just as they came from the sand, as specimens of the fine work done by the Yale & Towne Company, also showing the difference between castings which had been treated by that process and the rough casting. The castings were ornamental card receivers, such as are illustrated elsewhere in this issue, and as there is evidence to show that the original patterns were very old, it would seem as if the foundrymen in the beginning of the present century were not without a considerable measure of skill in this direction.

The secretary was instructed to thank the Yale & Towne Company for their kind remembrance, and a vote of thanks having been given Mr. Chute for the paper rendered, the meeting adjourned until the third week in August.

The Berlin Bridge Company, of East Berlin, Conn., are building the iron roof on the new purifier house for the Philadelphia Gas Company, at Philadelphia, Pa.

NOTICE.

All advertisements under this head given two insertions free of charge when placed therein by subscribers. All others will be charged 2 cents per word for each insertion.

A WELL-KNOWN FOUNDRYMAN is open for an engagement as foreman or superintendent of iron foundry. Don't write unless you have a first-class position to offer. Addres N. E., care of THE FOUNDRY.

AN ENERGETIC YOUNG MAN of steady habits, with large experience on light bench work, rammer and machine practice, accustomed also to floor work up to 5-ton castings, and to handling men, desires a position as superintendent or foreman of a foundry. Address SUPT., this office.

Advertisements inserted under this head for 25 cents a line each insertion.

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country, small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

WANTED—Loam Molder for heavy and light castings. Steady employment. Man must be sober and industrious. Address, stating experience, wages and references, I. F. & M. W'ks, Ivanhoe, Wythe Co., Va.

FOUNDRY FOR SALE—I offer for sale the Aurora Foundry. New brick building, 40x60 feet, and everything in good shape. Price, $3,000; one-half cash, balance in one and two years. Address W. C. WENTZ, Aurora, Neb.

FOR SALE—Entire outfit of a first class Foundry and Machine Shop. Will see itemized list of what we have for sale in July number. All in first class condition and will almost give it away. Apply at once. Have to quit business owing to bad health. Address CHARLES GILBERT & SON, Albany, Mo.

FOR SALE—Entire Foundry Outfit, at Huntington, Ind., consisting of 1 40 H. P. Boiler, flasks, column, stairway and bracket patterns; ladles, holding from 150 to 300 lbs. metal, together with a hundred other articles that is necessary to equip a first class foundry. We prefer to lump the entire lot to one party; will come near *giving the stuff away*; we are compelled to remove it from the building. Address E. K. CLAYTON & SON, Huntington, Ind.

FOR SALE.—Second hand machinery and appliances: One 26 and 1 30 degree Cupola, latest design; core oven, with carriage 4x20, crane, brass furnace, tumbling barrel. A large supply of flasks, ladles, facings, tools, etc.; an extensive lide of patterns for architectural, engine, jobbing work, etc. One 12 H. P. engine and boiler; 1 12-foot bed engine lathe, with all attachments; 1 upright drill, 30 degrees (new); lot of blacksmith's tools, etc.; 1 wood-turning lathe, 12-foot bed; all iron jig saw (new); cut-off saw, wood-working tools, etc., together with a good stock of plumbers' tools and mill supplies—all in first class condition, and can be bought for one-fourth its cost. Apply at once; have to quit business owing to bad health. Address CHAS. GILBERT & SON, Albany, Mo.

10,000,000 BARRELS? SOLD IN 1892

"Peerless"

In all that its name implies. To obtain all kinds of handsome if not perfect castings at a merely nominal cost of labor and at minimum expense for the material, use appropriately

Peerless Pure Plumbago

or Peerless Wash

for all kinds of castings; these materials may be brushed, dusted or rubbed on and into the moulds with the hands. Are the essential material required for Dry Sand, Core and Loam Work and Large Bells.

For Machinery of all kinds we manufacture

Peerless Lubricated Plumbago
The best dry lubricant extant.
Also the UNIVERSAL FAVORITES,

Peerless Bronze Facing or Blacking
For fine Bronze, Brass, Chandelier and other amalgamated metal castings. The

Peerless Fine Stove Plate Facing
Both light and heavy. Also for Piano Plate.

Peerless Steel Casting Wash
The celebrated discovery that will assist in "peeling" or "stripping" steel castings at almost the tap of a hammer.

Peerless Heavy Machine Facing or Blacking
For general use is "last though not least."
No "sticking, no washing," no "running," easily "slicked," easily "peeled."

Peerless Trial Samples
SENT FREE OF CHARGE on application. State what kind of castings you want the material for, when ordering.

— THE —

Chicago Foundry Supply Co.,

CHICAGO, ILL., U. S. A.

MANUFACTURERS OF
Foundry Facings and Blackings.
IMPORTERS AND REFINERS OF
Graphite, Black Lead, Silver Lead or Plumbago.
AND DEALERS IN
All Kinds of Foundry Supplies, Moulders Tools, Sand, Brick and Iron, Brass and Steel Foundry Equipments.

We also manufacture the celebrated BRILLIANT Facings and Blackings which bear a meritoriously world-wide reputation. We invented these and gave them their trade name in the spring of 1886, as the records in Washington will verify. "All names similar in sound or meaning to the word" BRILLIANT as applied to Foundry facings or blackings WERE ADOPTED SINCE JULY 26, 1886. This we are amply prepared to prove. "Imitation is its best recommendation."

THIS IS NOT A CATCH-PENNY OR PATENT MEDICINE ADVERTISEMENT

Claiming to cure all the ills the iron craft is heir to with a uniform remedy. To obtain perfect castings or the best desired results five conditions are indispensible, these qualifications are the metal, fuel, moulding sand, molders and facings or blackings. The latter alone are neither responsible for good nor are they to be blamed for evil results; their attributes even if they perform their functions to perfection do but assist the other factors herein mentioned. They may work perfectly in one kind of sand or under certain grades or mixtures of iron and yet often act adversely when used on another sand or under other metals that have no affinity for them. The Facings or Blackings are but one of the factors upon which are dependent satisfactory, economical or artistic castings. All these conditions being present at the same time constitute the combination known in mythology, tradition and history as "The Philosopher's Stone," a transparent and glaring humbug.

Do You Want to make Big Money in '93?

THERE IS ONLY ONE WAY TO DO IT,

Turn out Nice, Bright, Smooth Castings from the Molds and Save Expense of Dressing, Cleaning and Scraping same Afterwards.

OBERMAYER'S GOODS WILL DO IT!!

SEND FOR CATALOGUE.

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—MANUFACTURERS—

Foundry Facings, Supplies and Equipments.

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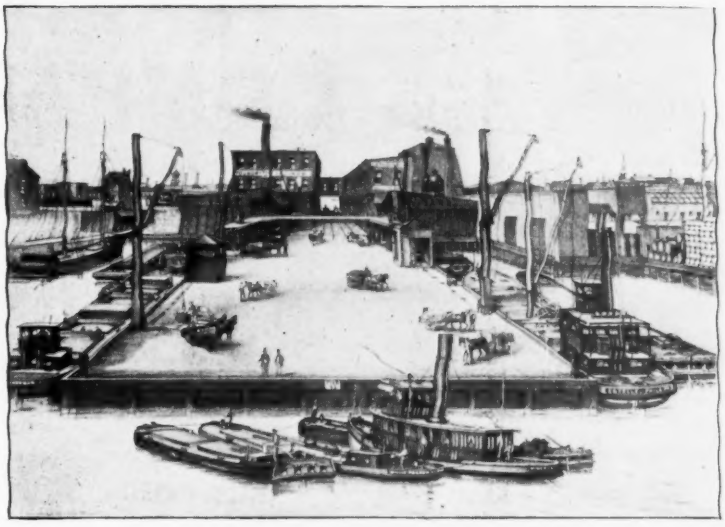
Quaker City Facing Mills.



This cut shows our Sand Dock, Boats, Etc.

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OF ALL BRANDS.

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WE MAKE THE FOLLOWING:

Brass Iron, Steel and Galvanized Iron Riddles, Scratch Brushes, Wire-Cloth, Bristle Brushes, Bellows, Hay-Rope, Etc.

GROUND SILICA ROCK, + + + +

STEEL MOLD WASH,

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J. W. PAXSON & CO.

PHILADELPHIA, PA.

WHITEHEAD BROTHERS COMPANY,

—DEALERS IN—

Moulding Sand, Fire Sand,
Philadelphia Sand, French Sand,
Fire Clay, Kaolin, and Foundry
Facings and Supplies of all Kinds,
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Cedar Hill, N. Y.
Coxsackie, N. Y.
Clinton Point, N. Y.
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Coeymans, N. Y.
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ESTABLISHED 1868. INCORPORATED 1884.

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FOUNDRY SUPPLY CO.

OF BOSTON, MASS.

Manufacturers of and Dealers in

Every Description of Iron and Brass Founders Equipment and Supplies.

Cupola Furnaces	Shovels,	Facings,	Rammers, Hand & Long
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Steel Wire,	Ladles,	Riddles,	Silver Lead,
Soft Wire,	Tools of all Kinds,	Prints Back,	Steel Brooms,
Crucibles,	Charcoal,	Mineral,	Pattern Brushes,
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Moulding Sand, Fire Sand and Clay.

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Cargo and Carload Shipments direct from Banks.

ESTIMATES for complete outfit for Iron or Brass Founders given on receipt of number of molders proposed on both floor and bench. We keep in Stock a Complete Assortment of Supplies. Flour and Patent Clamps, Greens Snap Flask, Iron Flasks for Brass Founders, Fire Bricks, and Koalin.

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PURCHASING AGENTS' OFFICE
FRASER & CHALMERS,
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H. P. YOUNG, PURCHASING AGENT.

Nov. 28, 1892.

Messrs. Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--Replying to your favor of the 18th concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he has ever used. Yours truly,

H. P. YOUNG,
Purchasing Agent.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--We have tried your Perfect Wash and find it as its name indicates. Please ship us two barrels more, and oblige, Yours truly,

McINTOSH, SEYMOUR & CO,
Auburn, N. Y.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--Please ship 40 bbl. of your Founders' Perfect Wash, quality as last.

EDW. P. ALLIS & CO.
Milwaukee, Wis.

C. F. M. FOUNDERS' PERFECT WASH

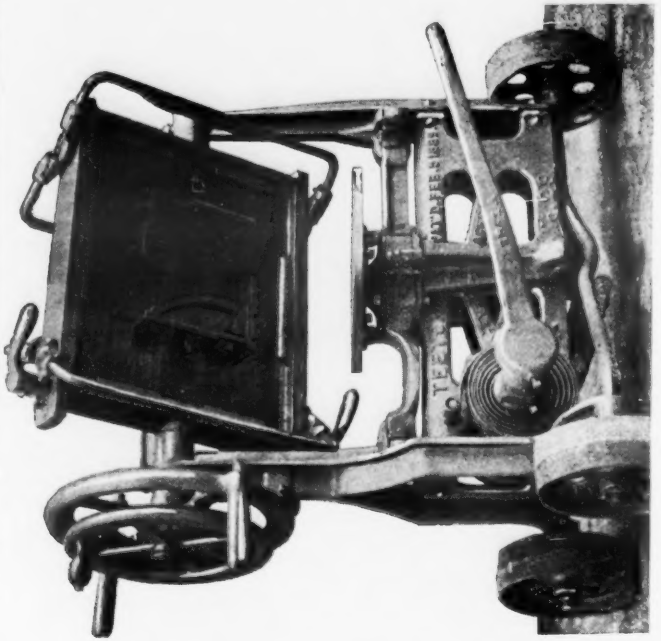
IS MADE ONLY BY

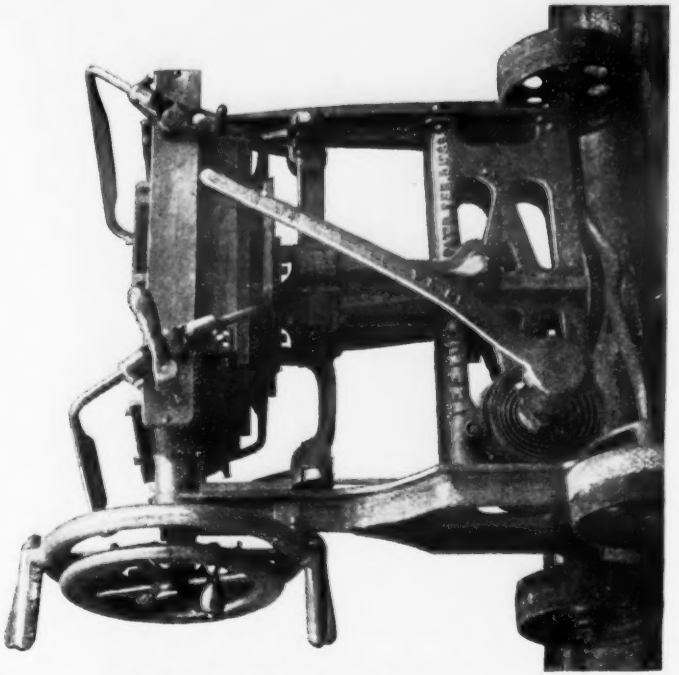
CLEVELAND FACING MILLS,

—Manufacturers of all Kinds of—

Foundry Facings, Blackings & Supplies.

CLEVELAND, OHIO.





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Large Numbers are in Use in some of the principal Foundries in the Country.

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TEETOR MOLDING MACHINE Co.

Write for Catalogue, Testimonials, Etc.

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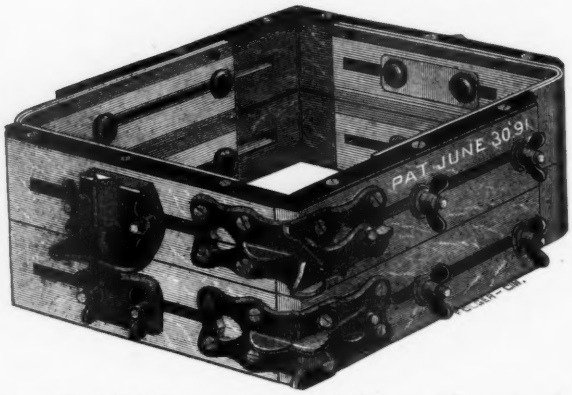
The Adjustable Snap Flask Co.,

LIBERTY, UNION CO. IND.

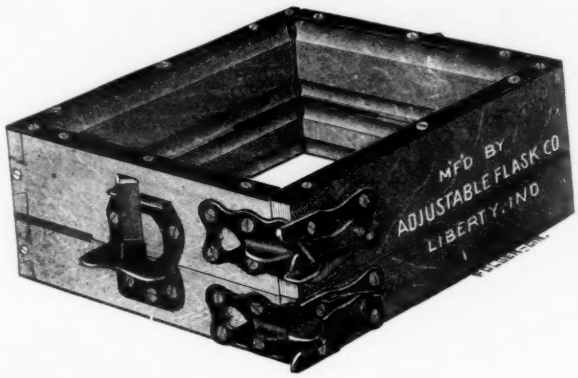
The Combination Adjustable Snap Flask.

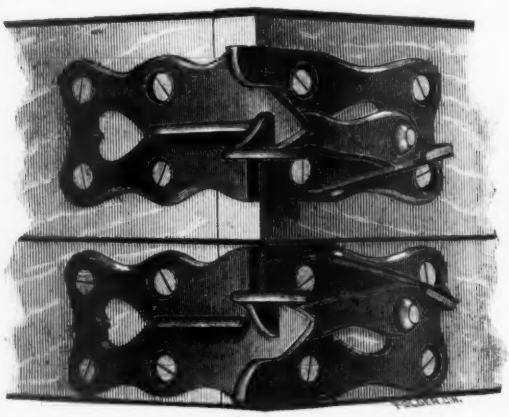


We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.





AUTOMATIC LATCH.

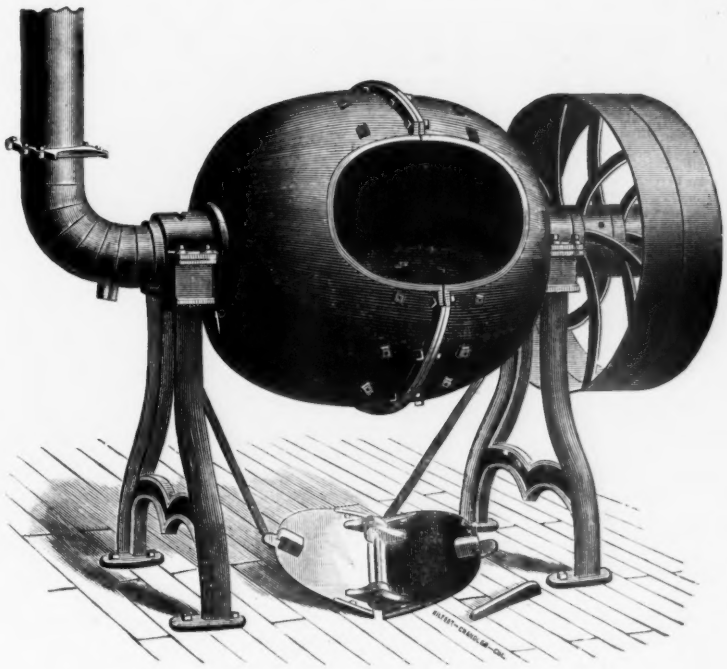
Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

Write for Catalogue. Prices and Terms sent on Application.

FOR SALE BY ALL OF THE LEADING FOUNDRY SUPPLY DEALERS.

Stover's Improved

Exhaust Tumbling Barrel



The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of Barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address

Stover Manufacturing Co.,

205 RIVER STREET,

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Mention THE FOUNDRY.

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Over 7,000 Miles of Railroad Under One Management.

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EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustible stone quarries of every description: immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

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The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATER UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world Will appreciate any correspondence requesting information, etc.

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FROM CHICAGO AND ST. LOUIS TO
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And all Points in Colorado, Utah and California.

P. S. EUSTIS, Gen'l Pass'r and Ticket Agent,

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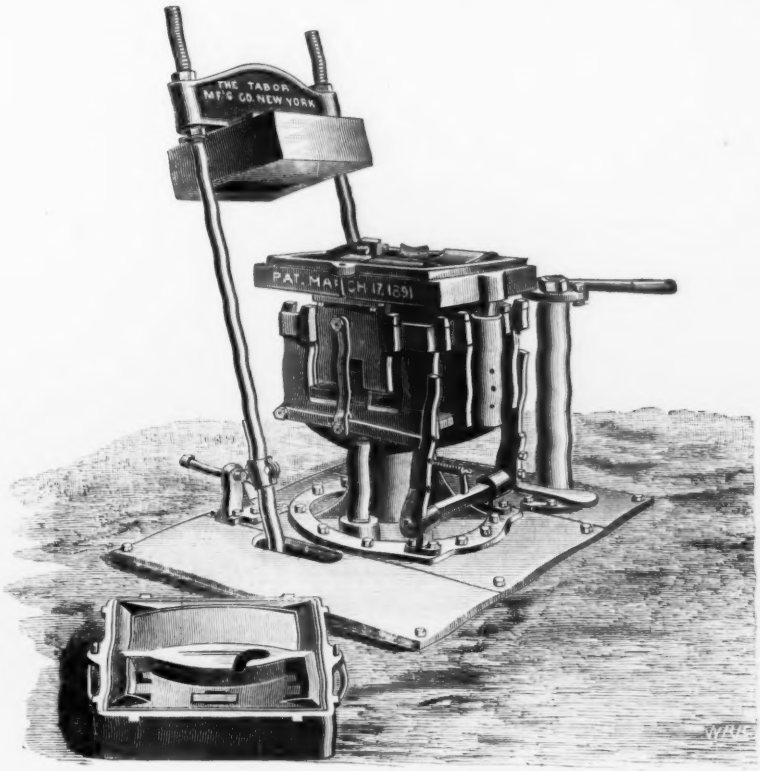

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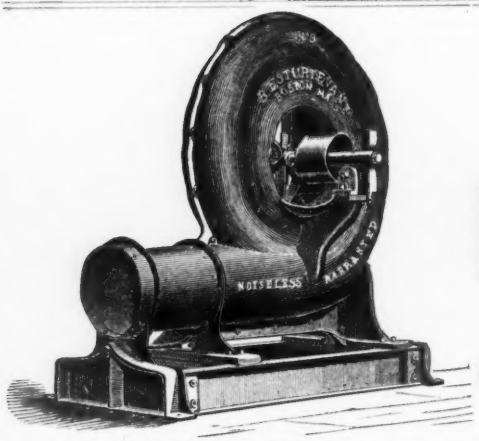

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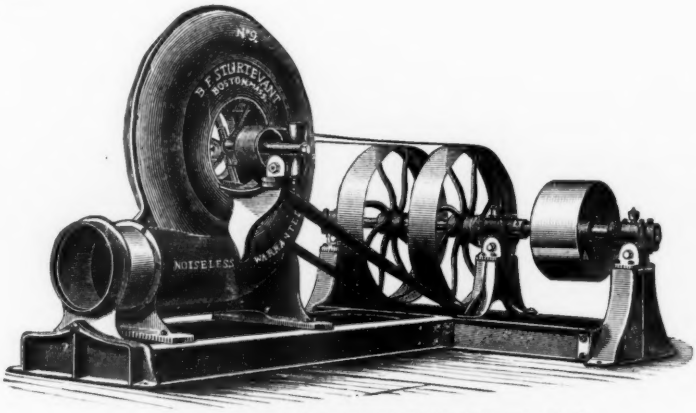

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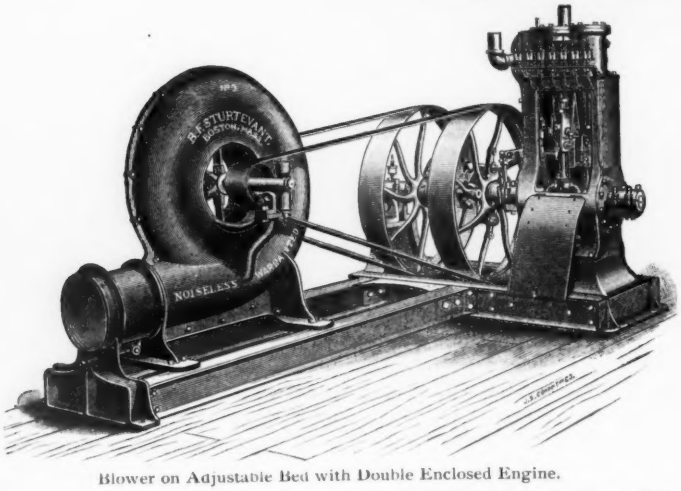

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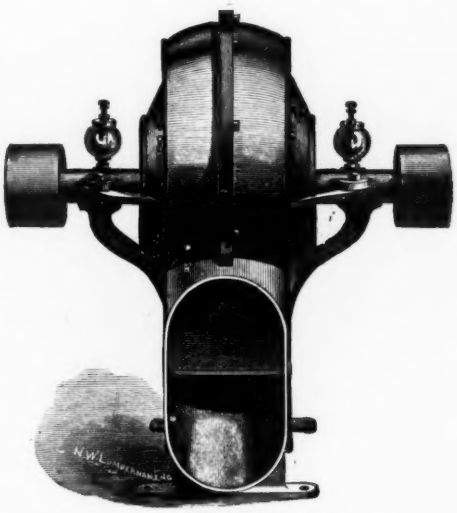

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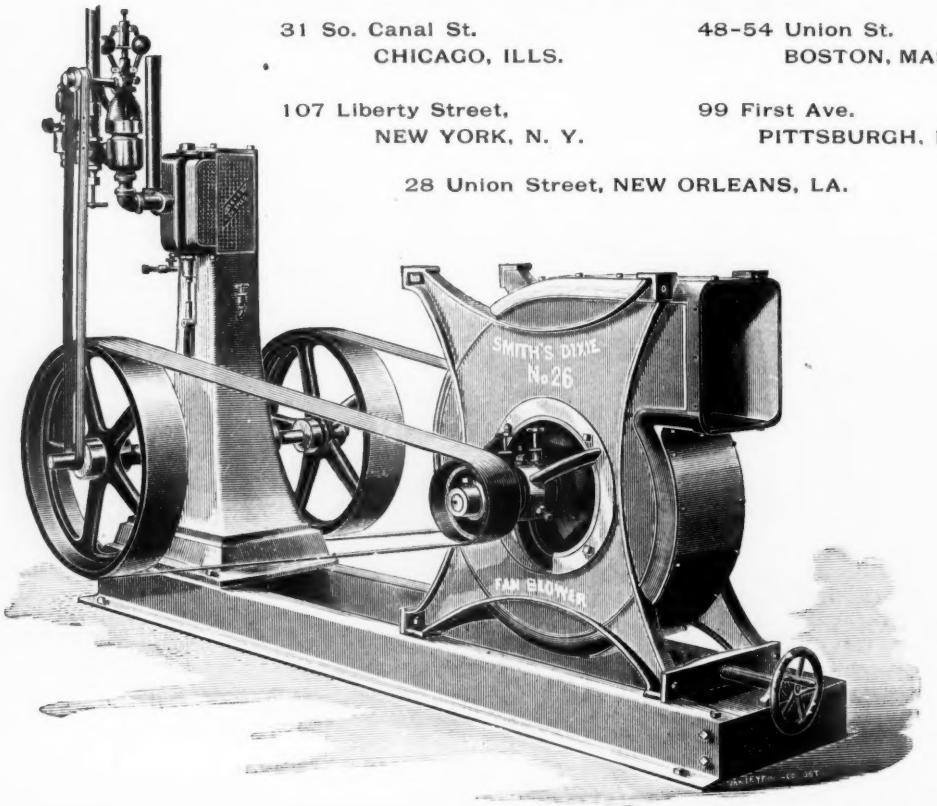

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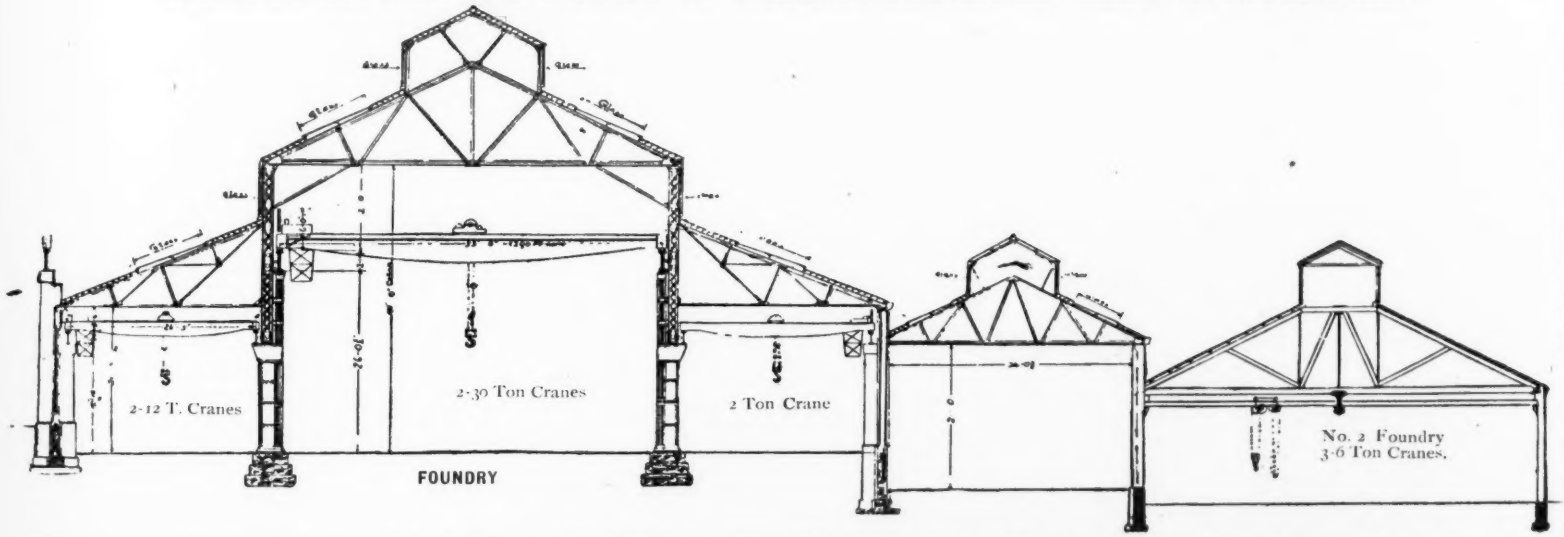

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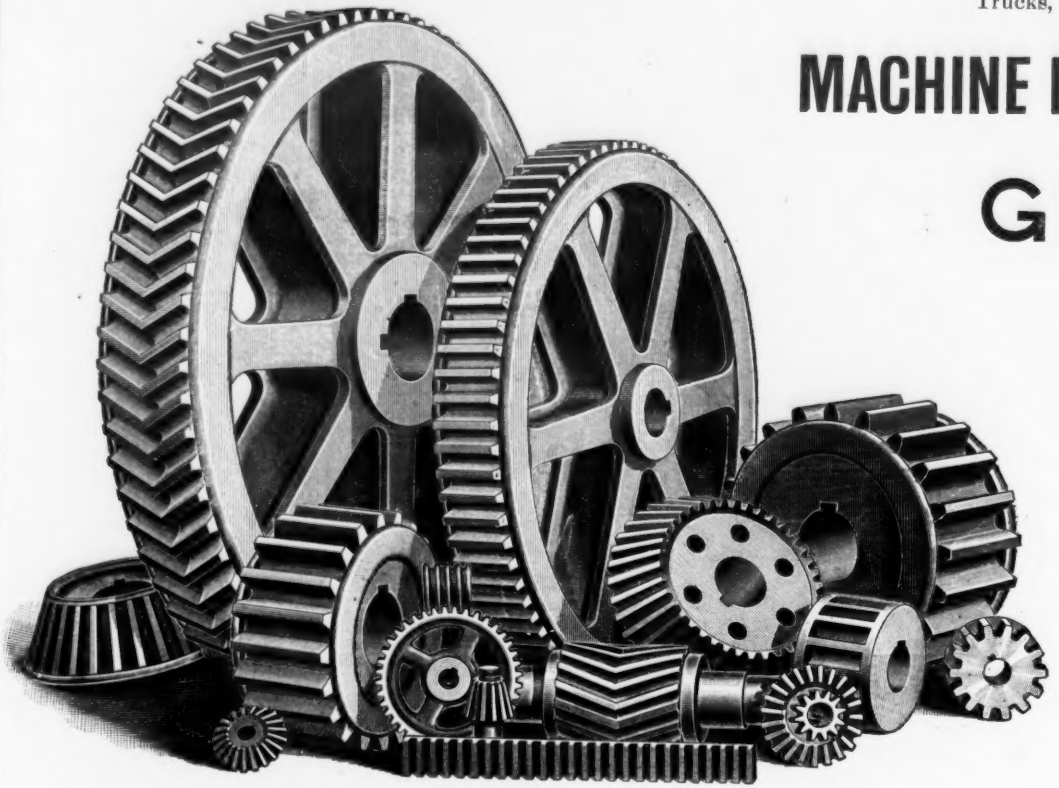

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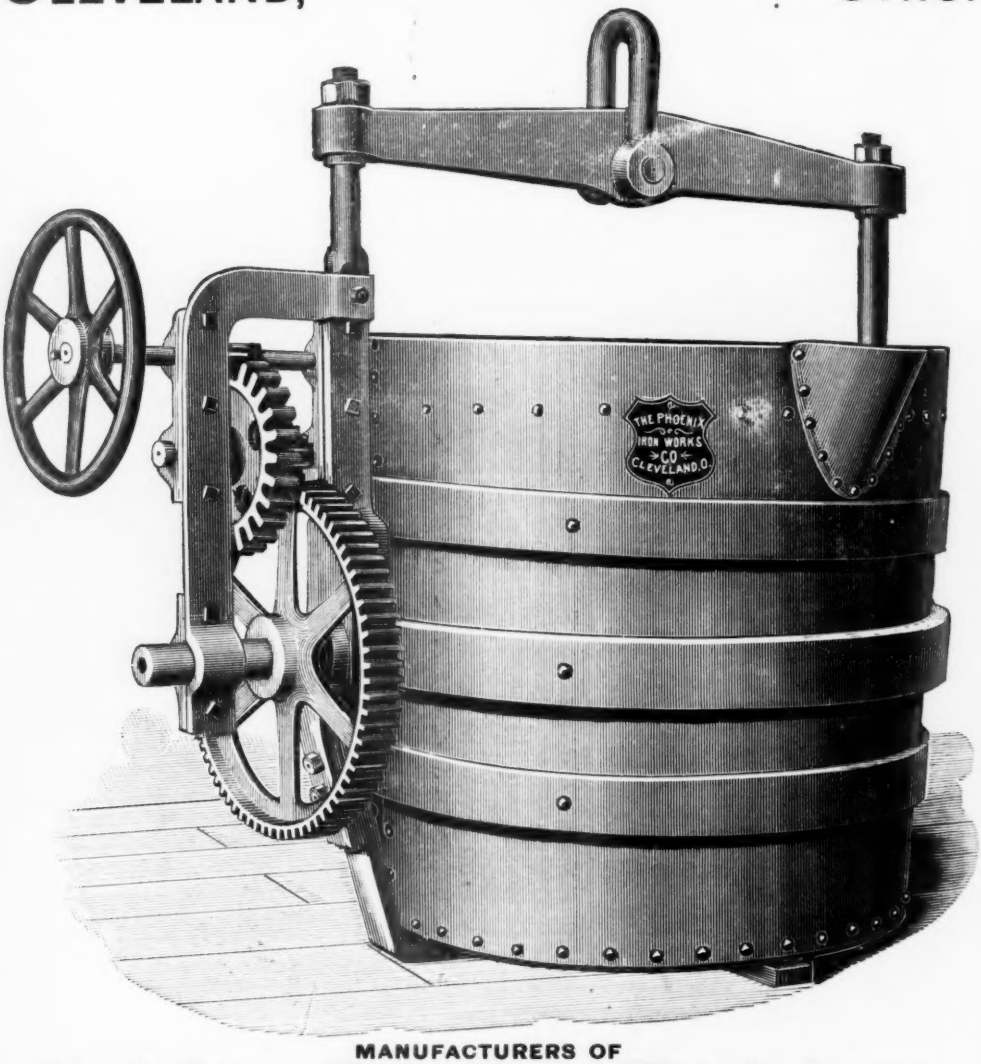

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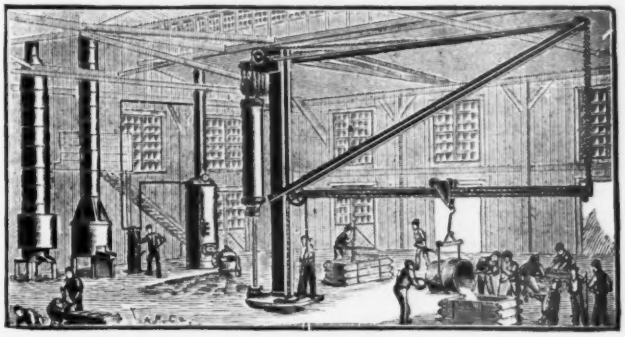

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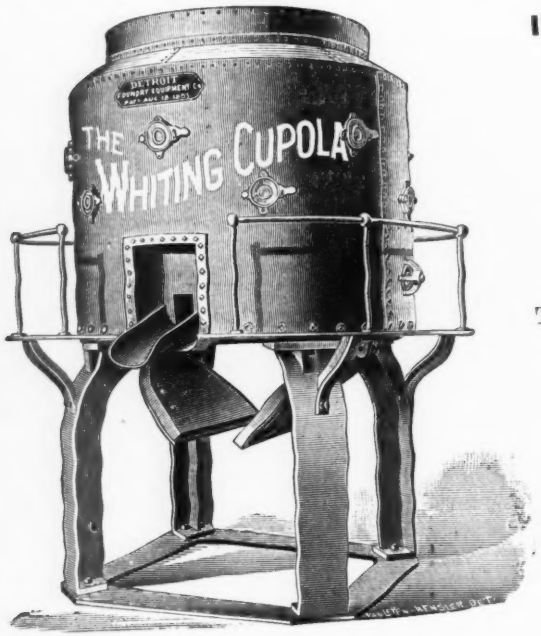

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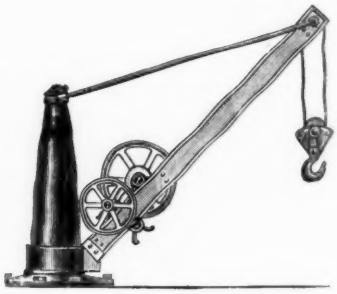

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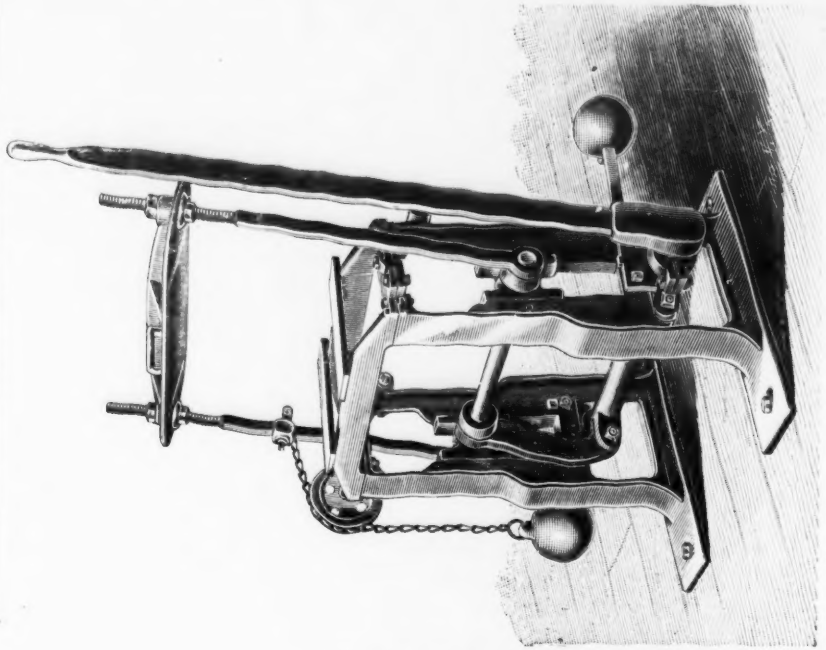

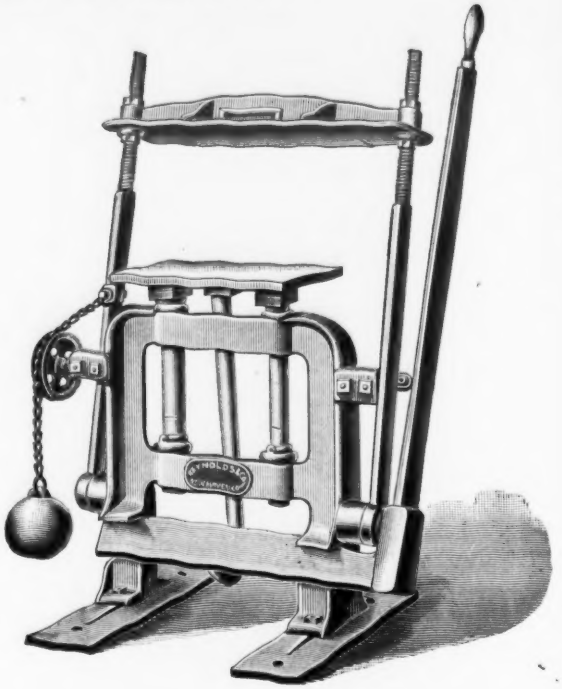

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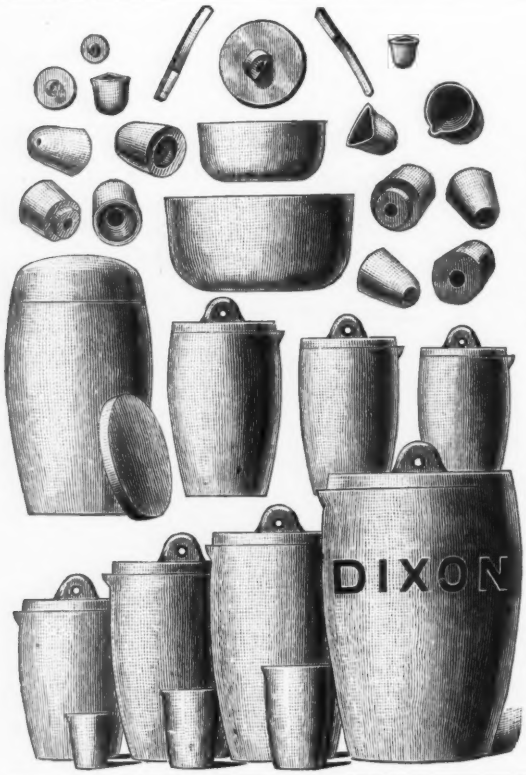

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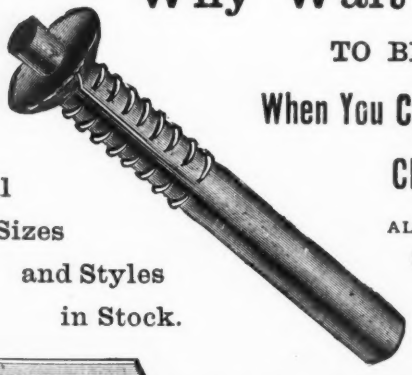

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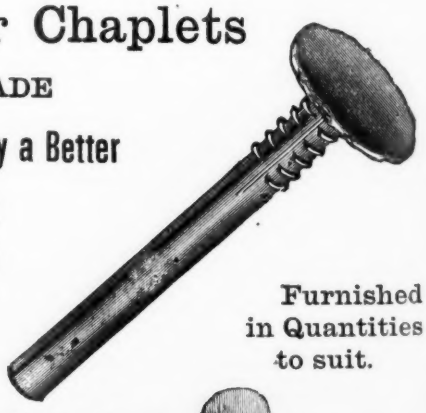

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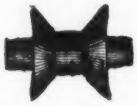

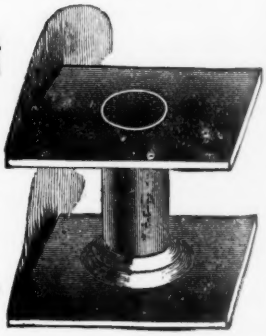

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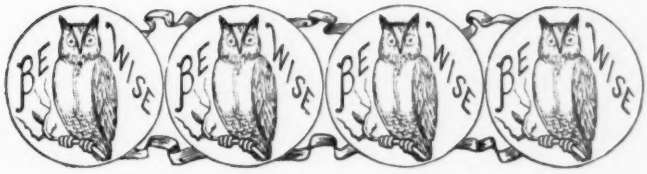

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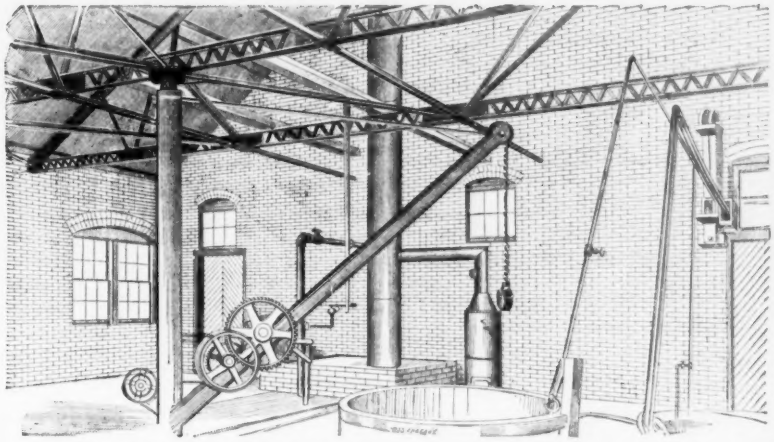

The above illustration is taken direct from a photograph, and shows the construction of an Iron Truss Roof, designed and built by us for The Fowler Nail Co., at Seymour, Conn. The building is 44 ft. in width by 62 ft. in length, and is used for a Casting Shop, where the danger from fire is very great. The side walls being of brick and the roof trusses of iron, the danger is entirely eliminated.

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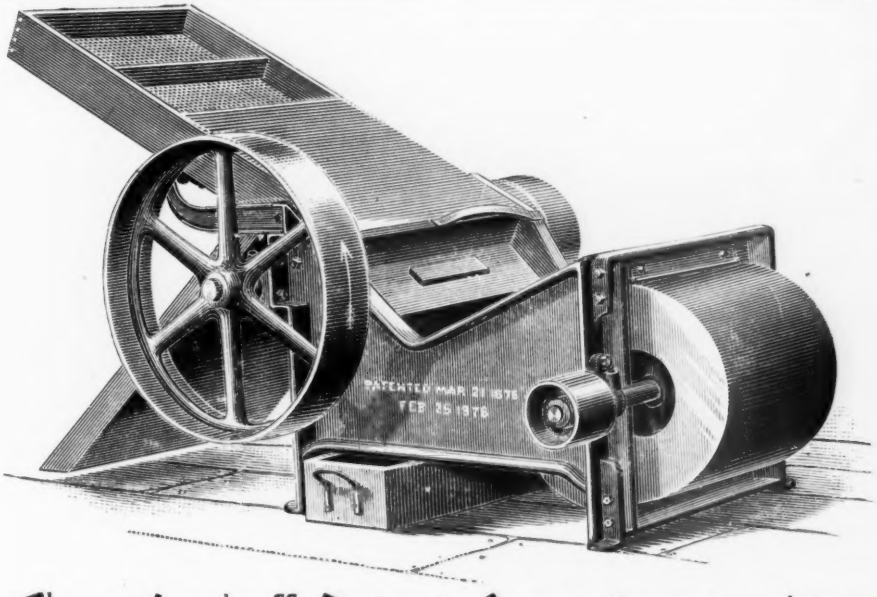

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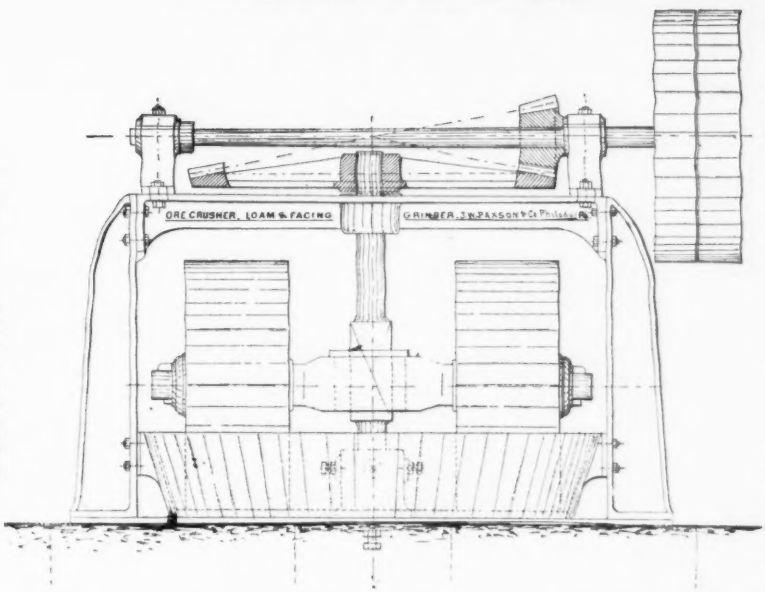

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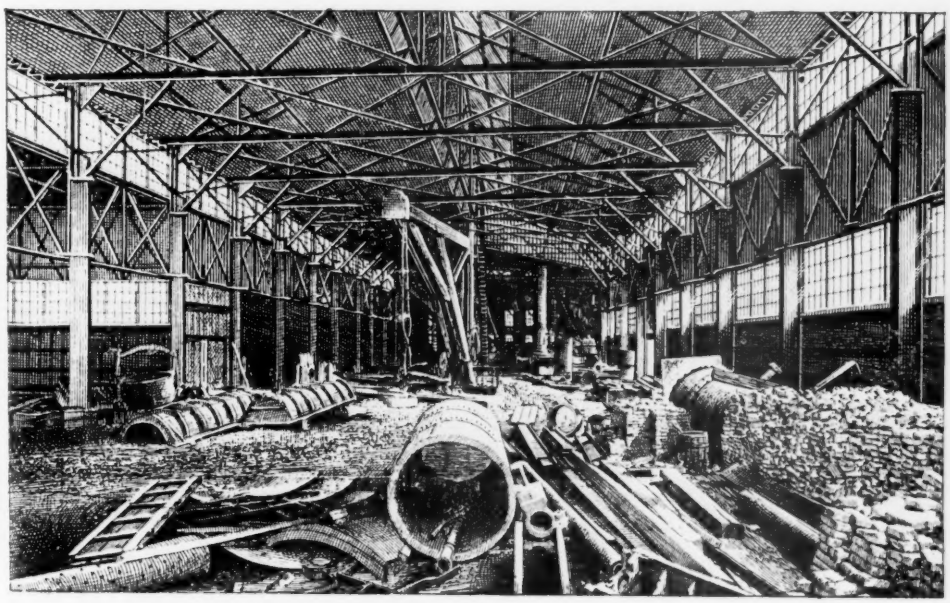

The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

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LEADS THE WORLD WHEN USED ON

Loam, Dry Sand and Skin Dried Castings.

NO CASTINGS TOO LARGE.

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Please ship us on as soon as possible, 1000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We find it works better than anything we have ever used.

Yours truly,
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FRASER & CHALMERS,
FULTON AND UNION STREETS.

Chicago, Nov. 28, 1892.

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Gentlemen;—Replying to your favor of the 18th, concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he has ever used.

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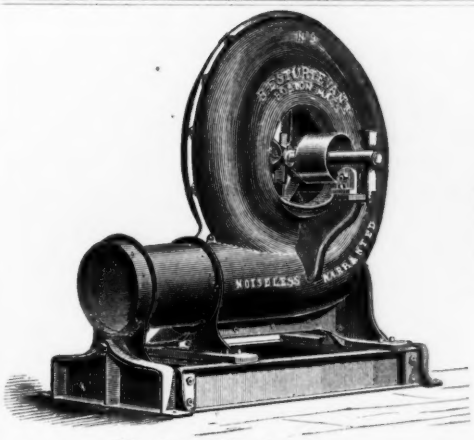

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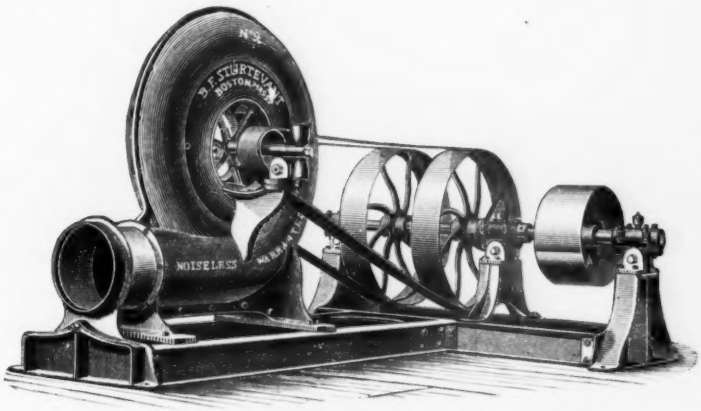
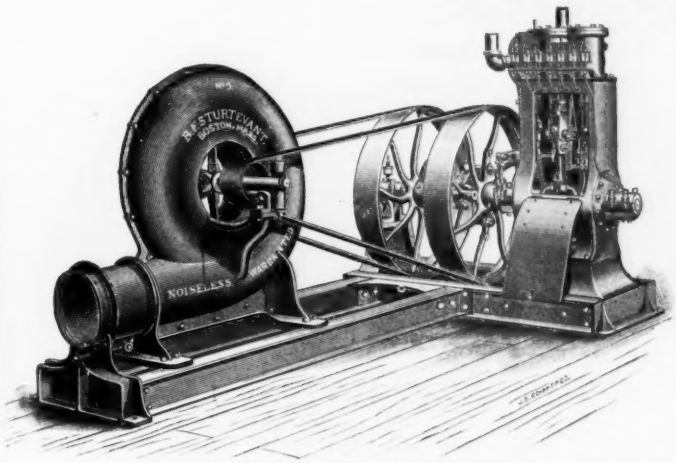


Blower on Adjustable Bed with Combined Countershaft.



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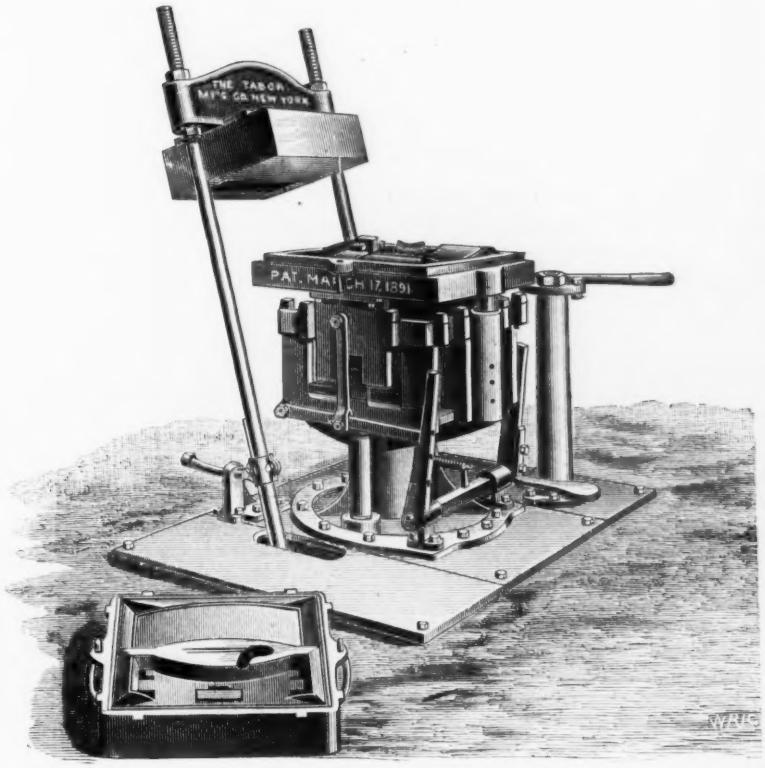

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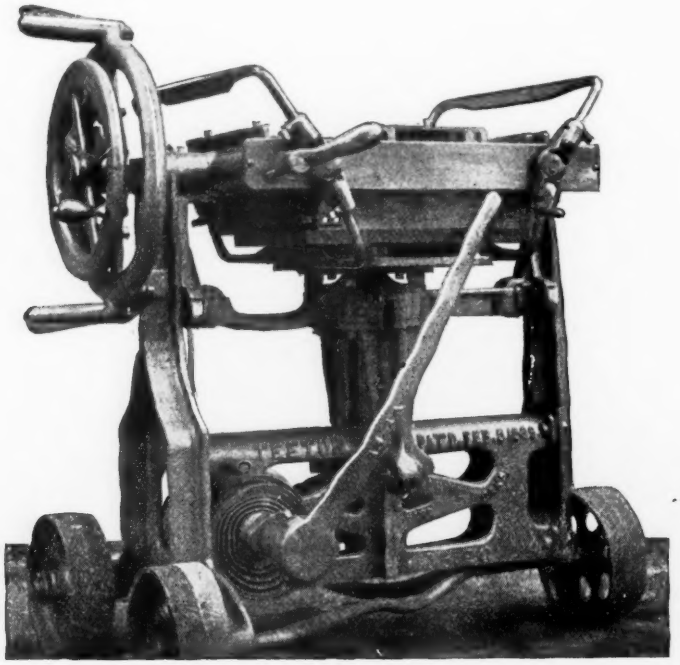

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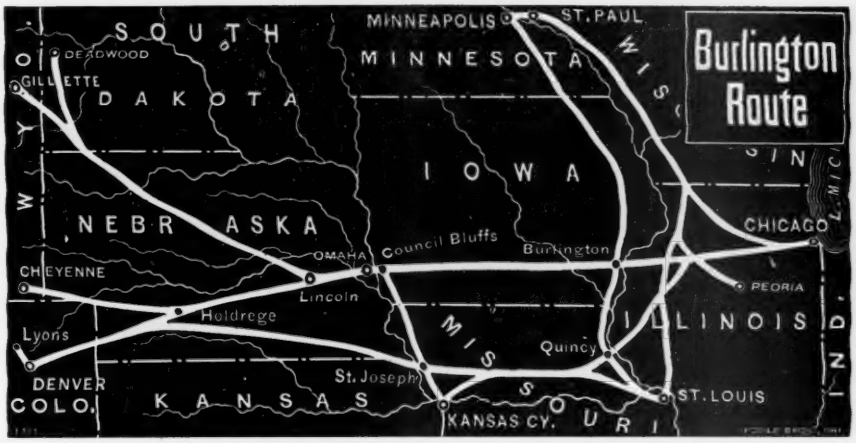

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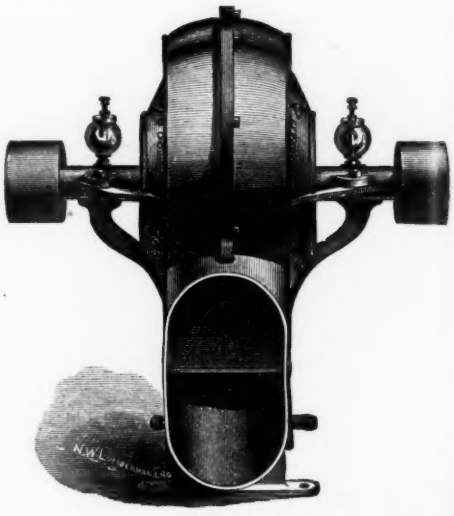

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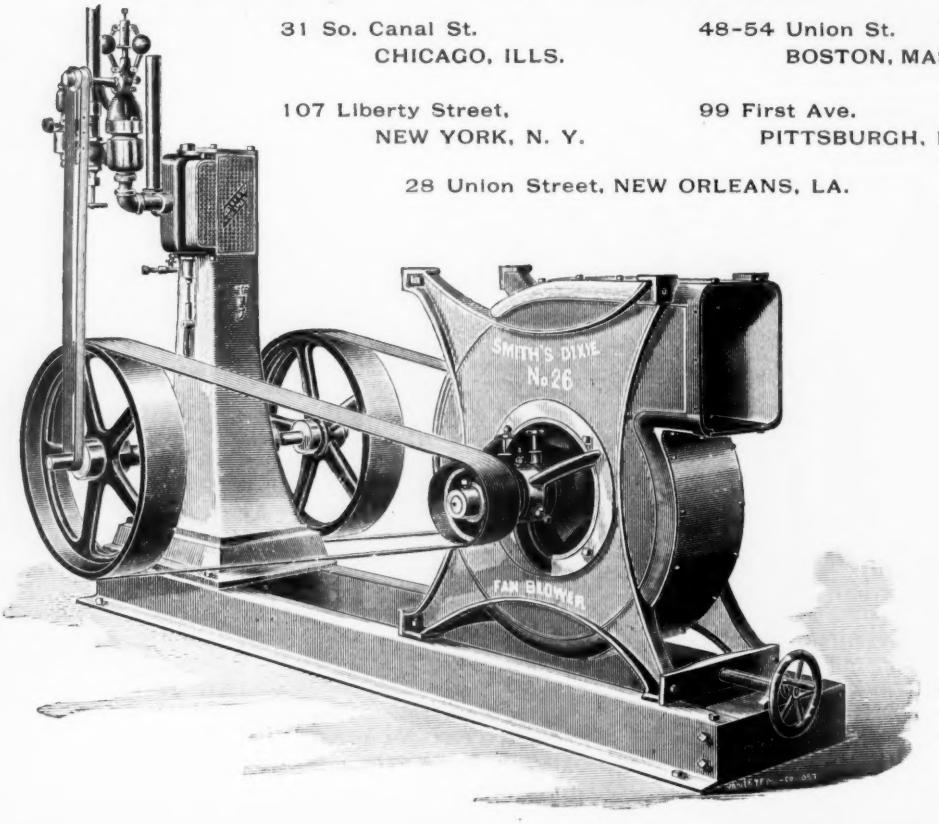

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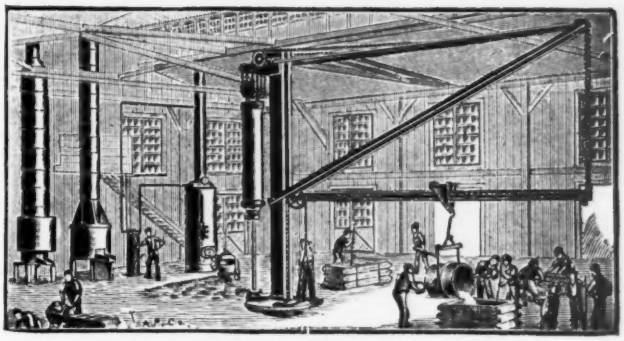

Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

THE GREATEST FOUNDRY CRANE KNOWN.

The Latest New Foundry to Adopt this Crane is that of

GAAR, SCOTT & Co.,

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Who will use **FIVE** of Them.

WHY DID THEY SELECT THIS CRANE?

They went up to **FRASER & CHALMERS, CHICACO,** and saw the Crane at work in the foundry there and that settled it.

Everybody who sees this Crane at work, falls in love with it.

WHY?

Because it does the work quick. Lifts a load while other cranes are getting ready to do it. Lifts 10 tons as quickly as 10 pounds. Never gets out of order. No shocks. No jars. Requires no special operator. Every man in foundry works it. No matter how dumb or careless, can't hurt himself, work, or machine. All molders like it. Has a perfect motion. Foundries using it say it saves its cost in a year in good draws. Swings very easy. A 5-ton crane with a 3-ton load on it is in about the same condition as other cranes with out any load on them. Crane is attached to ordinary steam supply at the trifling cost of a little pipe. Uses so little steam it is never missed. In fact, in a small card we can't give one-half of its excellencies. You must write us.

In moulding Car Wheels these Cranes save their cost in a year.

Are Being Adopted by the Best New Car Wheel Works.

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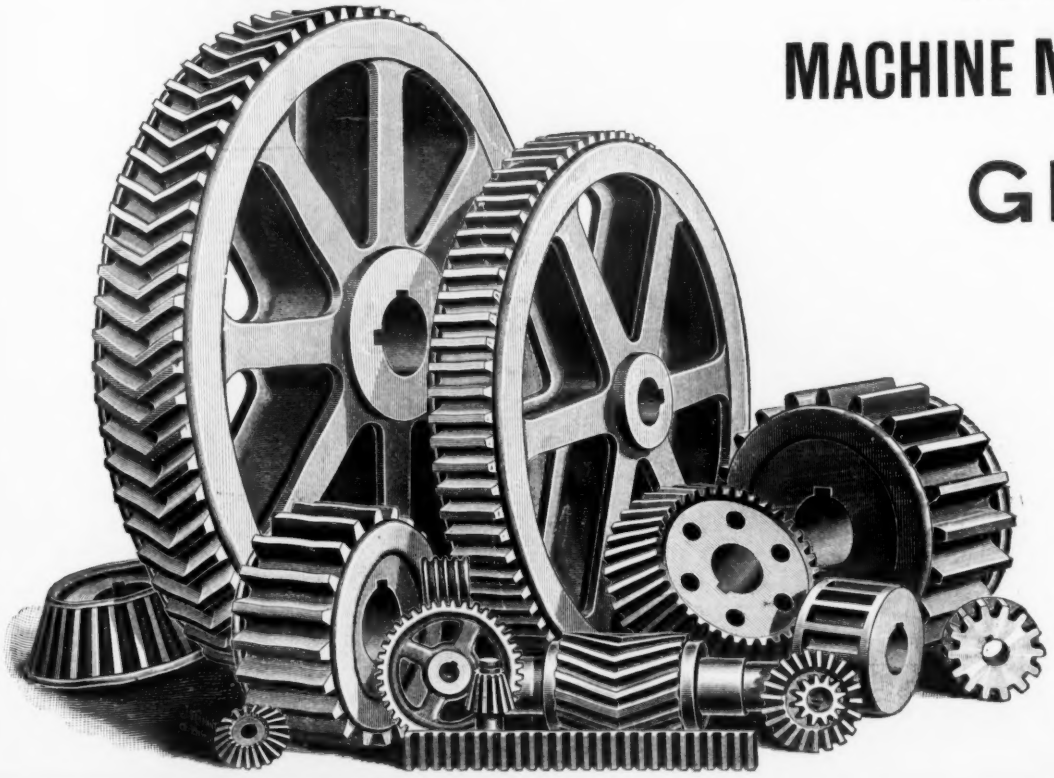

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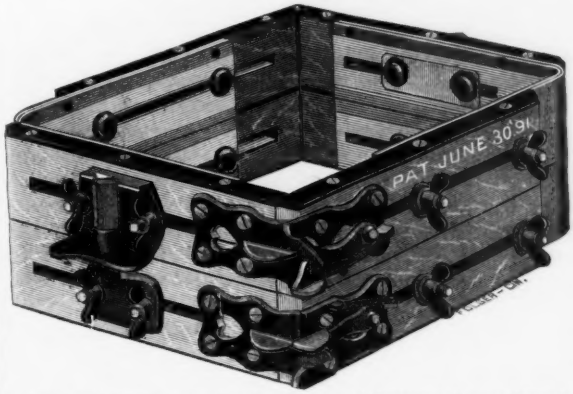
LIBERTY, UNION CO. IND.

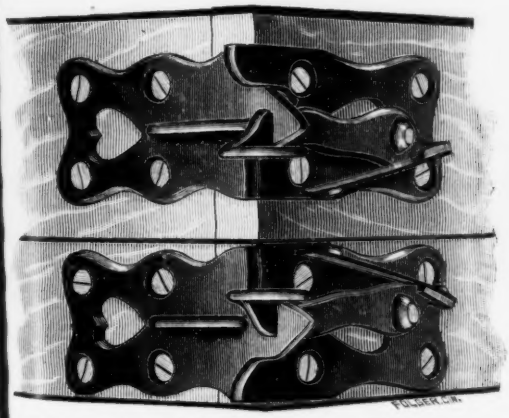
The Combination Adjustable Snap Flask.



We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.



AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order: When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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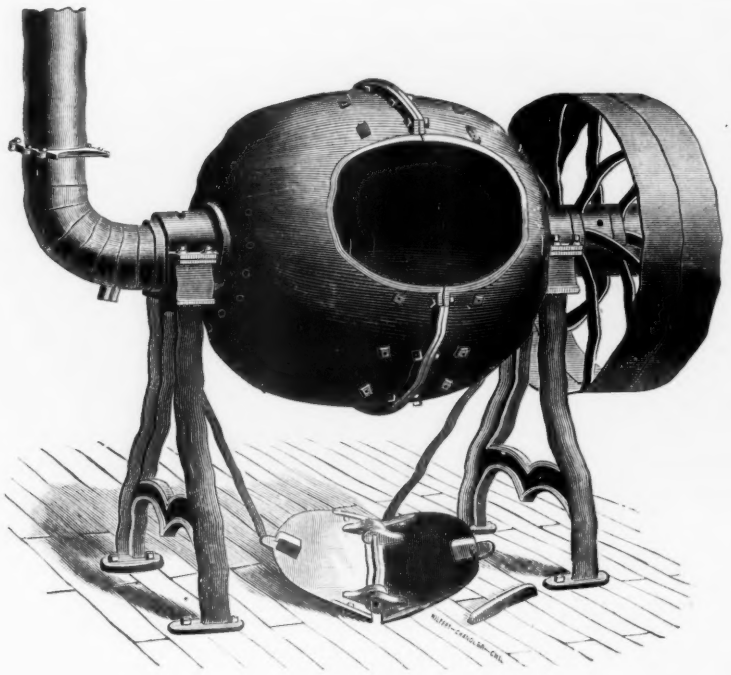

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. *It gives the contents a double motion or action—from ends to center and from side* to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of Barrel.

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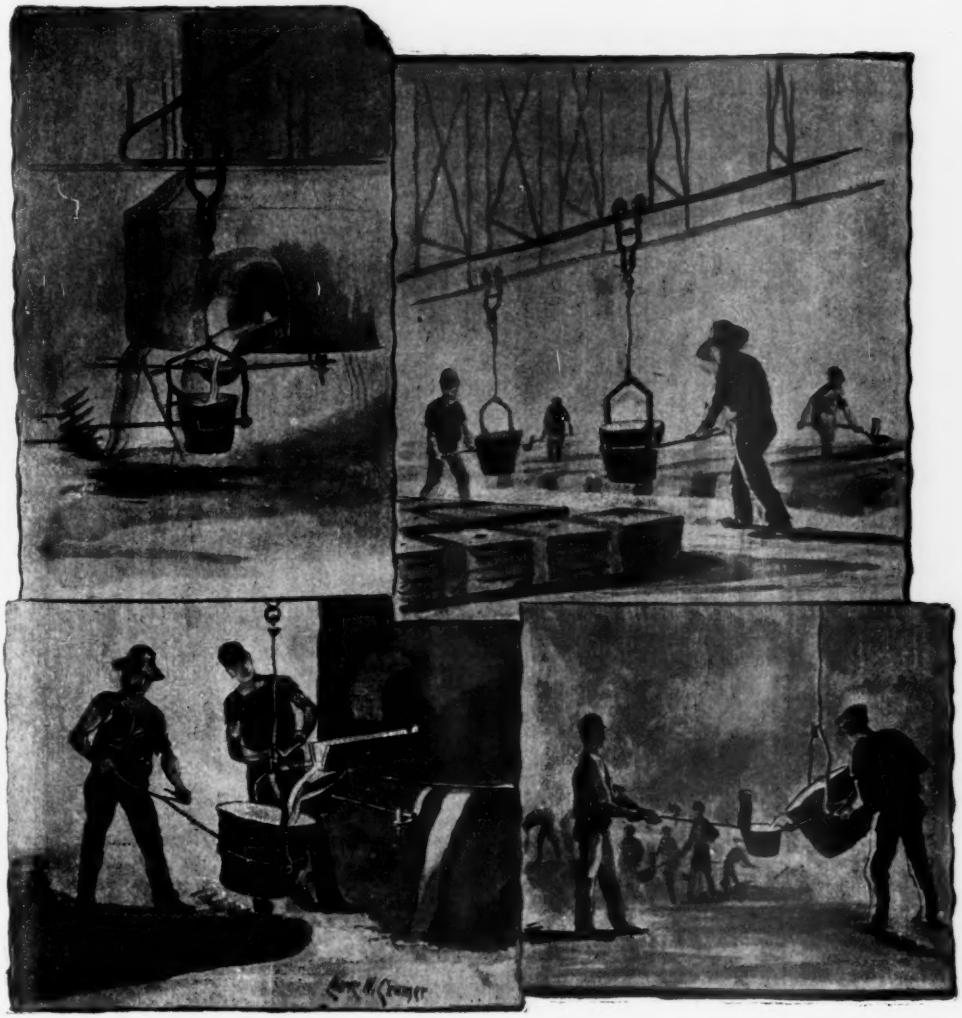

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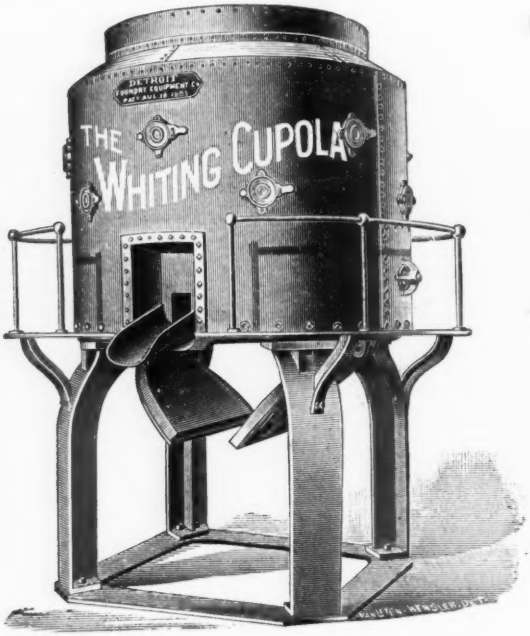

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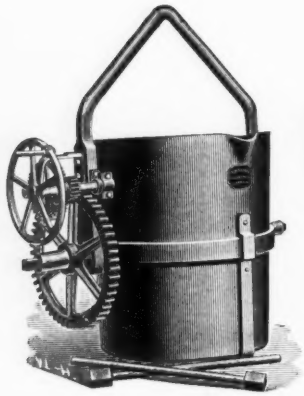

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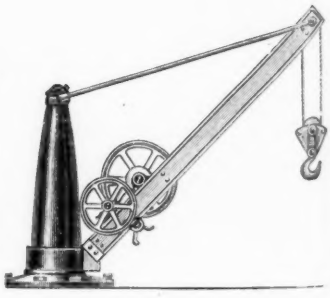

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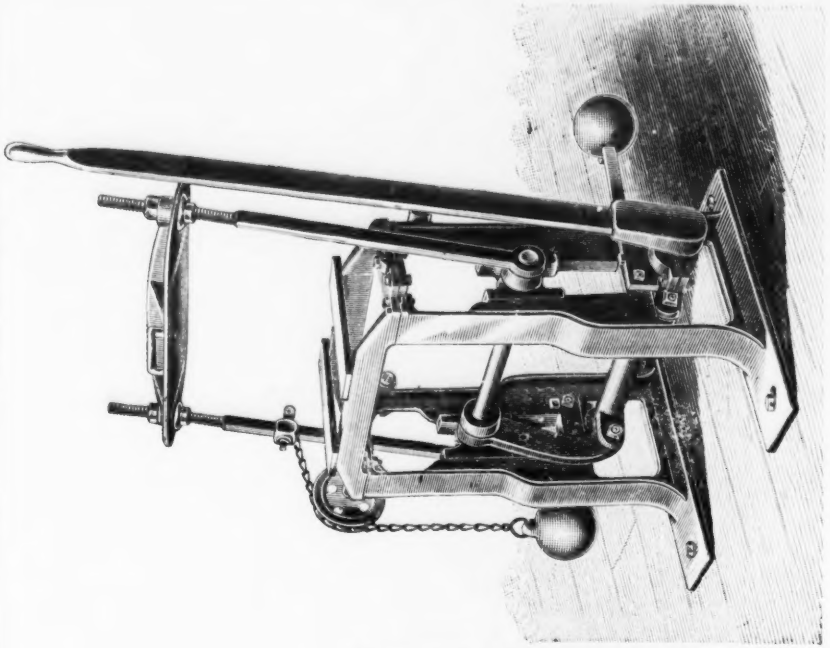

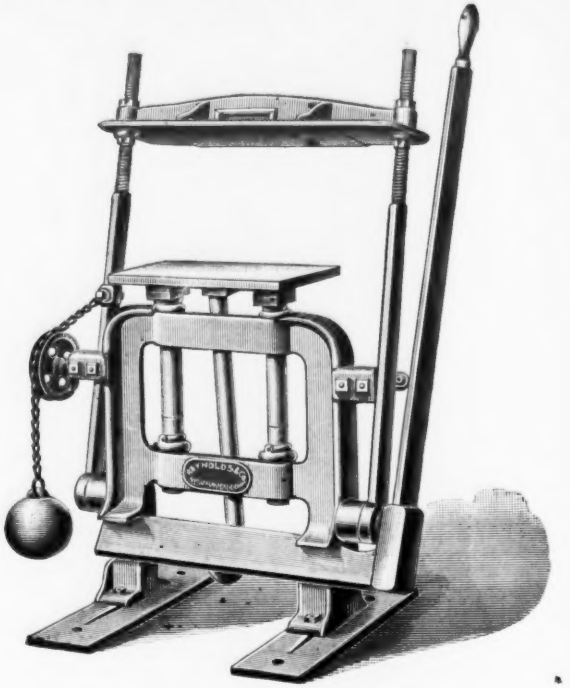

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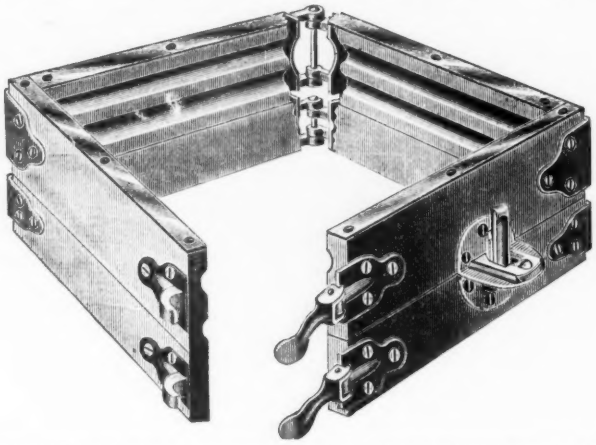

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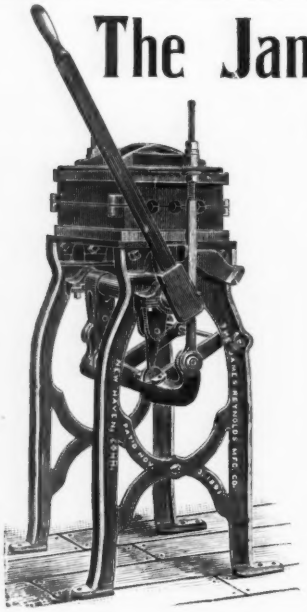

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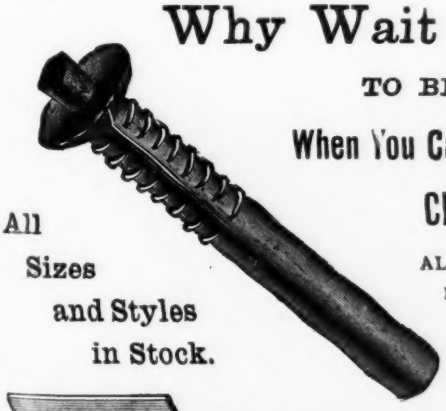

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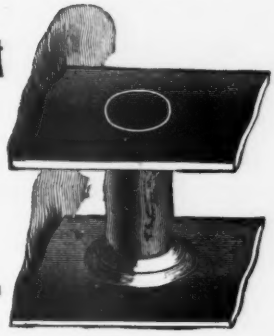

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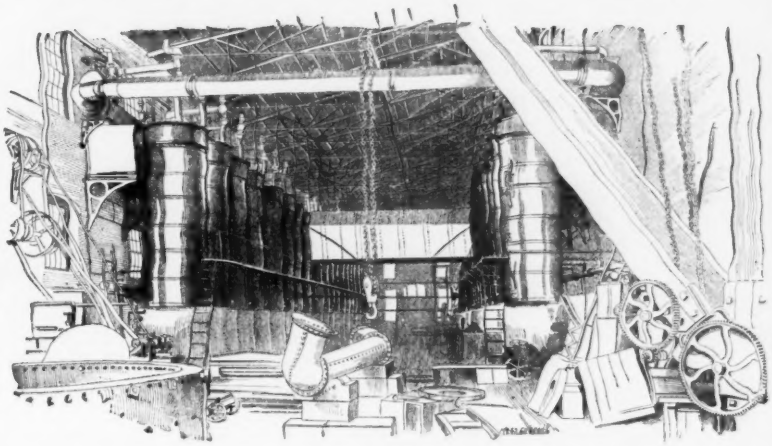

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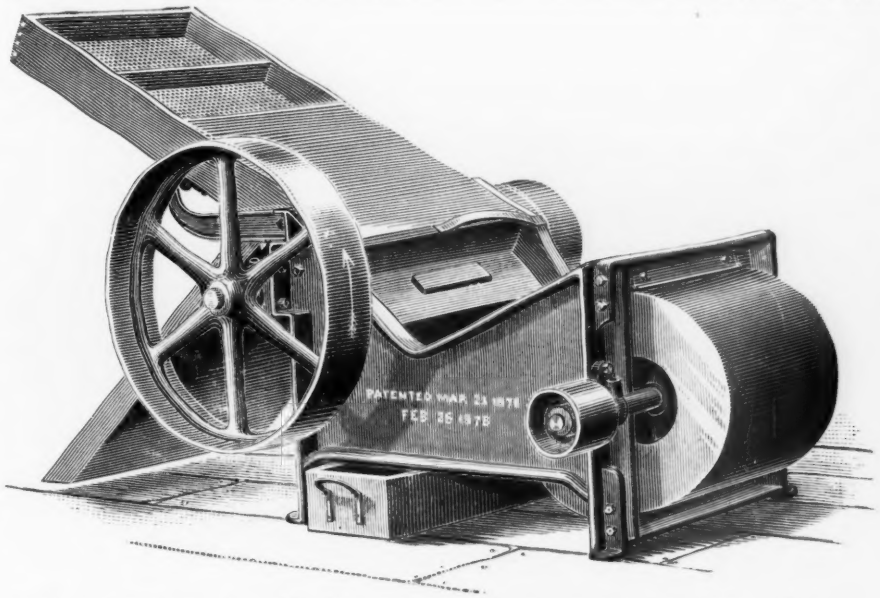

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Foundry Facings and Blackings.

IMPORTERS AND REFINERS OF

Graphite, Black Lead, Silver Lead or Plumbago.

AND DEALERS IN

All Kinds of Foundry Supplies, Moulders' Tools, Sand, Brick and Iron, Brass and Steel Foundry Equipments.

The S. Obermayer Company,

CINCINNATI, OHIO.

—Manufacturers—

FOUNDRY SUPPLIES

The following Goods in stock ready for Immediate Shipment.

Ceylon Plumbago.
India Silver Lead.
Heavy Machinery Facing.
Heavy Stove Plate Facing.
Blackstone Facing.
National & Eagle Return.
Core Compound.
German Crucible Clay.
Crane Ladles—Worm and Gear Ladles.
Foundry Riddling Machines.
Monk's Molders Tools.
Pig Iron Barrows.
Iron and Steel Foundry Barrows.
Stove Putty and Cement.
Purified Stove Varnish.
Rub Stones.
Foundry Buckets.
Facing Bellows.
Sprinkling Pots.
Wire Cloth.
Draw Hooks.
Coke Forks.
Grind Stones
Crucibles.
Steel Brooms.
Steel Riddles.
Brass Riddles.
Hand Ladles.
Core Brushes.
Pig Iron Testing Machines.
Separating Machines.
Straw Rope Twisting Machines
Wire Wheel Casting Brushes.
Molders' Dusting Brushes.
Molders' Double Brusher.
Molders' Steel Shovels.
Molders' Bellows.
Pattern Letters, (Brass and Metal.)
Steel Casting Brushes.
Molders' Hard Brushes.
Brunell's Wire Wheel.
Emery Wheels.
Coal and Sand Screen.
Raw Hide Mallets.
Molding Sand.
Fire Brick and Clay.
Black Varnish.
Foundry Flour.
Lime, Rosin.
Oil Vitrol.
Flour Spar.
Bolted Cement.
Swabs.
Wood Mallets.
Rammers, (Bench and Floor.)
Flue Brushes.
Galvanized Riddles.

Would like to have you examine above and write to us for quotations. We solicit at least a portion of your trade.

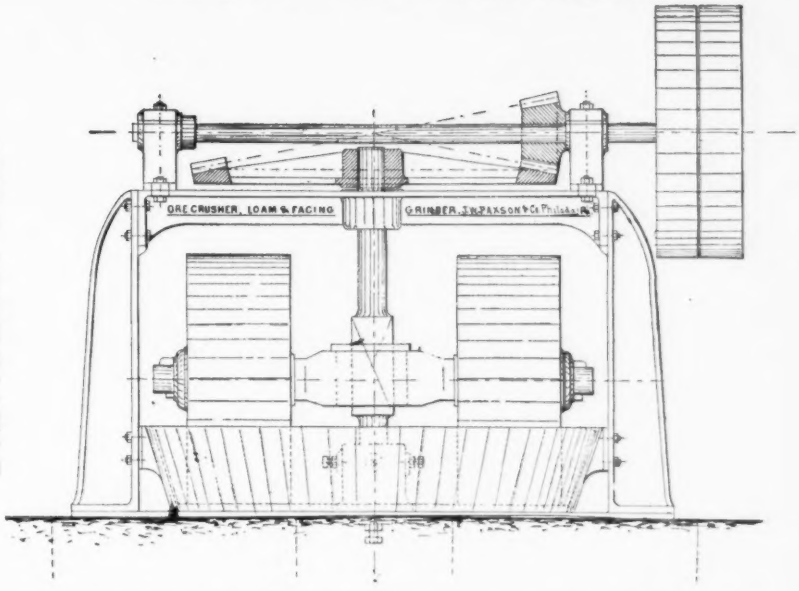
WRITE FOR CATALOGUE.

ESTABLISHED 1856.

Foundry Supplies and Facings

SAND, CLAY AND LOAM MIXERS

STATIONARY PAN.



Height Rollers, 36 inches; Face of Rollers, 15 inches; Floor Space, 8 x 6 feet; Weight, about 10,000 lbs. Made in three sizes, Steel Rollers and Ball Bearings.

MANUFACTURES

FACINGS.	SUPPLIES.	SANDS.
XX INDIA LEADS,	CUPOLAS,	OPEN HEARTH STEEL SANDS,
SILVER LEADS,	LADLES,	FIRE SANDS,
MINERALS,	RIDDLES,	SILICA SANDS Ganister,
RETURNS,	SHOVELS,	FIRE CLAYS,
CHARCOAL,	FIRE BRICK,	CHANDELIER,
SEACOAL,	BELLOWS,	ALBANY,
	Etc.,	Etc.

J. W. PAXSON & CO.

PHILADELPHIA, PA.

MENTION THE FOUNDRY.

WHITEHEAD BROTHERS COMPANY,

DEALERS IN

Moulding Sand, Fire Sand,
Philadelphia Sand, French Sand,
Fire Clay, Kaolin, and Foundry
Facings and Supplies of all Kinds,
Lead Facings a Specialty.

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PROVIDENCE OFFICE:
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BUFFALO OFFICE:
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Cheesequake Creek, N. J.
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Wareham, Mass.
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Willow Springs, N. Y.
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C. F. M. Founders Perfect Wash.

A Wonder to our Customers,
Puzzle to Our Competitors,
Wash We are Proud of,
Wash YOU would not be without
if you KNEW ITS VALUE.

ROBERT SMACK & Co., Iron Founders.

New York, Feb. 11th, 1893.

Cleveland Facing Mills, Cleveland, O.

Gentlemen:—Please ship us on as soon as possible, 1,000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We finds it works better than anything we have ever used.

Yours truly,
Robert Smack & Co.

New York City, April 12th, 1893.

Cleveland Facing Mills, Cleveland, O.

Dear Sirs:—Please ship us on as quickly as possible 1,000 lbs. C. F. M. Founders' Perfect Wash. Your Wash can't be beat.

Very truly yours,
Robert Smack & Co.
Pr. Sam'l J. Smack.

THE BLACK & CLAWSON CO.

Hamilton, O., March 29th, 1893.

Cleveland Facing Mills, Cleveland, O.

Gentlemen:—A short time ago you sent us a sample order, one bbl. core wash, which pleased us, and we now wish you to send us 10 more bbls. of the same article.

Yours truly,
The Black & Clawson Co.

BELL & FYFE FOUNDRY CO.

Brooklyn, N. Y., March 15th, 1893.

Order No. 689, Cleveland Facing Mills.

Please ship and note on invoice our Order Number, the following, 2 bbls. "C. F. M. Founders' Wash." Same as sent on bill Dec. 12th, 1892.

Bell & Fyfe Foundry Co.

FRASER & CHALMERS, Fulton and Union Streets

Chicago, Nov. 28th, 1892.

Messrs. Cleveland Facing Mills, Cleveland, O.

Gentlemen:—Replying to your favor of the 18th, concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he ever used.

Yours truly,
H. P. Young, Purchasing Agent.

Use our Wash, you will then have little use for Casting Brushes or Scrapers.

Especially adapted for Loam, Dry Sand and Skin Dried Castings. For Cores of any description. For Green Sand Work, when it can be rubbed in with the hand, or applied with a camel's hair brush.

No experiment, the fact is established that C. F. M. Wash is far superior to any other Foundry foremen from all parts of the country speak warmly of its merits.

We manufacture all kinds. Foundry Facings, Blackings, India Silver Leads, North Carolina Talc. Special facilities for grinding Seacoal Facing. Write—Your wants will have immediate attention.

CLEVELAND FACING MILLS,

THE FOUNDRY. CLEVELAND, OHIO.

WE are a small concern and can watch our production—Making no big Claims, but are sure to please our customers, No matter how far you are away, the cheapest facing you can use for Stove Plates is

NEW ENGLAND BURNED CHARCOAL,

Barrels light, Freight cheap. Same story on Silver Lead or Plumbago, (except weight.) Foundries in New York or New England States can buy all kinds of Facing and Supplies of us. Get satisfaction, save money, and make us happy.

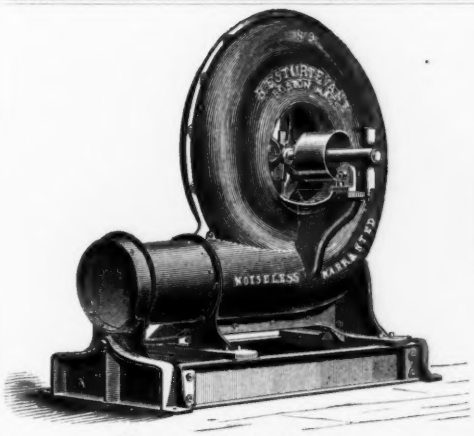
Springfield Facing Co.,

L. S. BROWN,

33 Lyman St. SPRINGFIELD, MASS.

LUMP HARDWOOD CHARCOAL

Carload Lots delivered to any part of the U. S. Ask for quotations.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

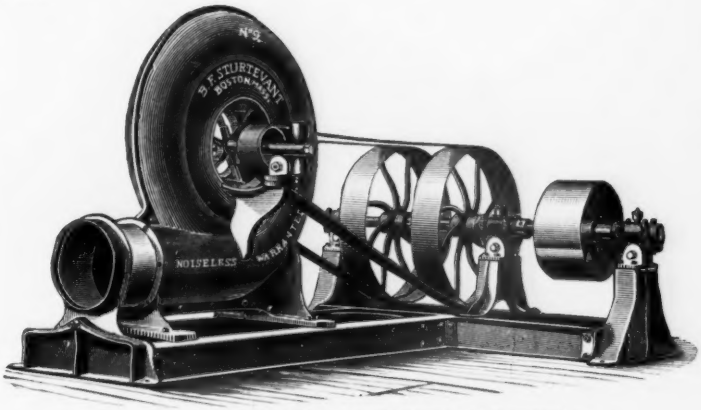
—FOR—

Cupola Furnaces and Forge Fires.

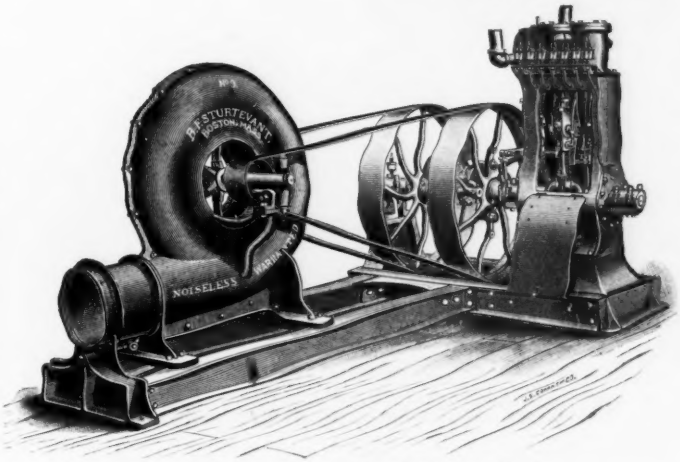
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors.

Send for Catalogue.

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91 Liberty Street, NEW YORK. *135 N. Third St. PHILADELPHIA.*
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STOCK CARRIED AT BRANCHES.

The Buffalo Steel Pressure Blower

FOR CUPOLA FURNACES, FORGE FIRES, ETC., ETC.

—BUILT ON—

Adjustable Bed Combined with Countershaft,

—ALSO WITH—

DOUBLE UPRIGHT ENCLOSED ENGINE.

BUFFALO FORGE CO.,

Send for Catalogue "F" 1892. **BUFFALO, N. Y.**

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DETROIT, MICH.

MANUFACTURERS OF

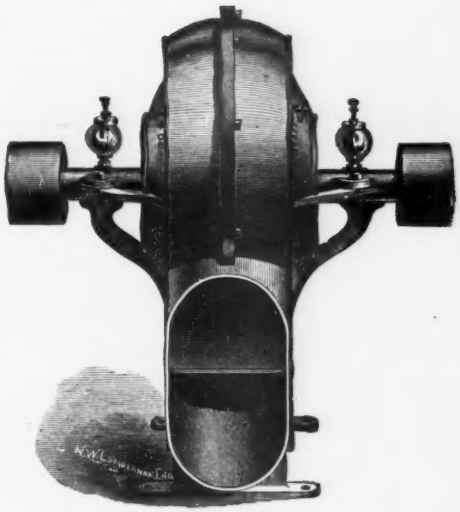
Forge & Pressure Blowers

Made for use in any position, and will produce any desired pressure.

Are combined with adjustable Bed and Engine, or Adjustable Bed and Counter Shaft.

All Sizes Kept in Stock.

Prices and Catalogues furnished on Application.



PATENTED 1883.

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CHICAGO, ILLS.

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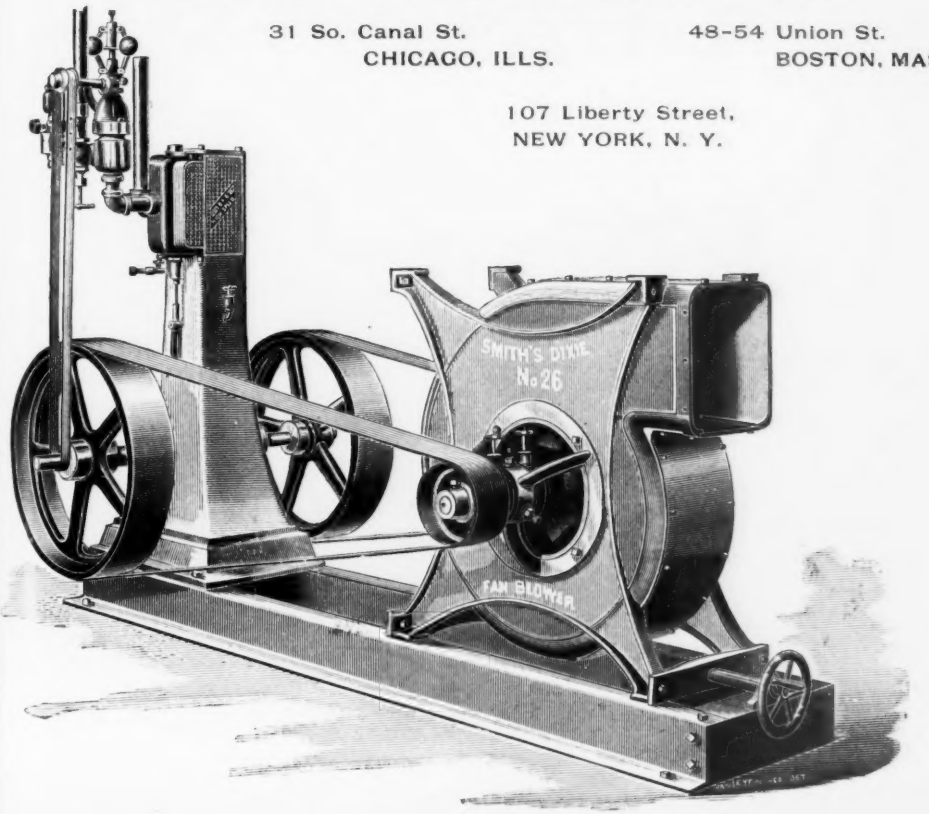
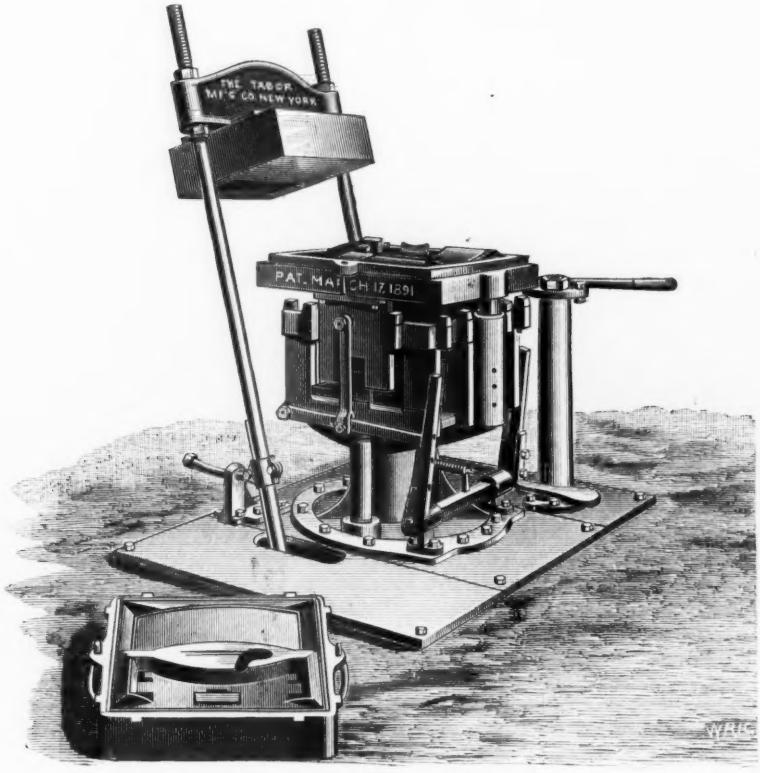


The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

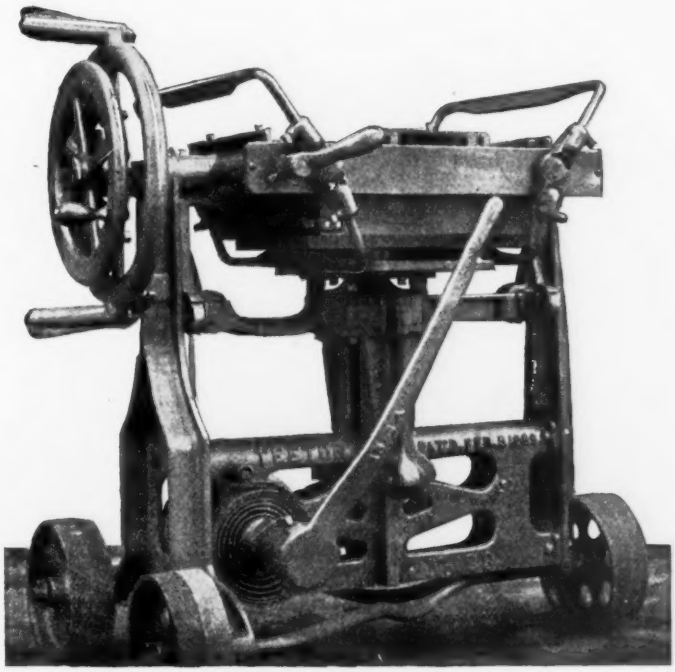
Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

111 and 113 Liberty Street,

NEW YORK, - - - N. Y.

Teetor Molding Machine

Large numbers are in use in some of the principal Foundries in the Country.



A Great Expense Saved

Nine-tenths of all patterns operated on the Teetor Molding Machine are molded without stripping plates. The convenience of changing patterns is commented on by a number of parties using our machine.

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Teetor Molding Machine Co

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DESIGNERS AND BUILDERS IN

IRON AND STEEL

Fire Proof Buildings

—FOR—

Foundries, Machine Shops,

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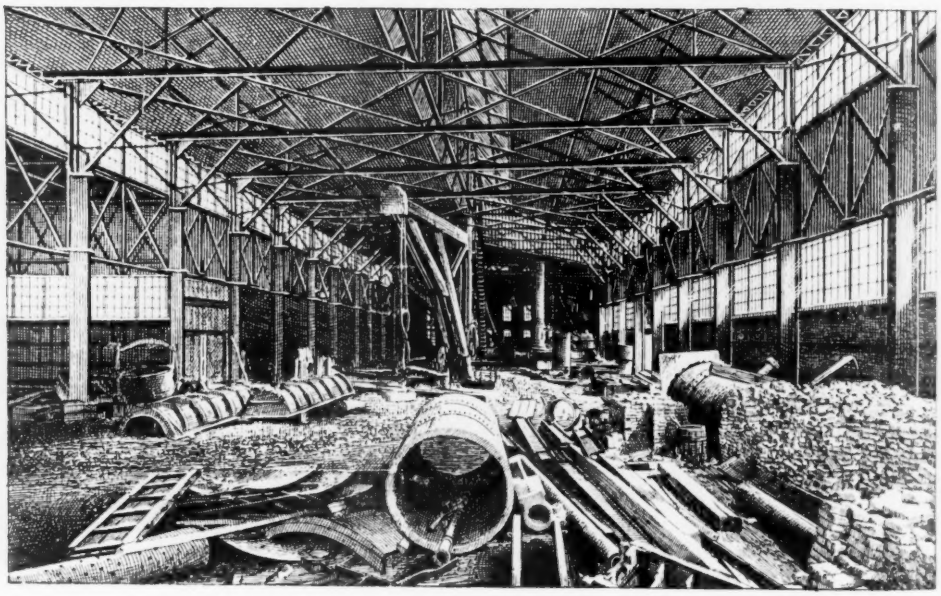
BUILDINGS DESIGNED FOR SPECIAL REQUIREMENTS.

Traveling and Jib Cranes for handling Heavy Castings and Machinery.



The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

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THISTLE BRAND
Anti-Friction Metal.

In Use Everywhere and endorsed as being Unexcelled.

Read what W. & A. Fletcher Company, the leading Marine Engine Builders of New York say:

W. & A. FLETCHER COMPANY,
NORTH RIVER IRON WORKS
Mudson St., 12th to 14th Sts.

Hoboken, N. J. May 12th 1891

Mr David Wilson
Dear Sir
In answer
to Your enquiry for our opinion of Your
Anti-friction White Metal. We would state
that We have used it in a number
of cases for the past two years and always
with entire Satisfaction — We consider
it excellent in quality and have no
hesitation in recommending its use
wherever Anti-friction metal is needed.
Yours Respectfully
W. & A. Fletcher Co.
A. Fletcher Pres.

—INVALUABLE FOR—

Steel Mills, Pressure Blowers, High Speed Engines, Dynamos, Saw Mills, Rolling Mills, Sugar Mills, Steamships, Flour Mills and all Machinery Bearings.

Brass Composition and Bronze Castings. Address

DAVID WILSON,

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American Foundry Practice, treating of Loam, Dry Sand, and Green Sand Molding, and containing a Practical Treatise upon the management of cupolas and the melting of iron, by Thomas D. West, a practical iron molder and foundry foreman. Contains 391 pages fully illustrated. Price, $2.50 postpaid, with "THE FOUNDRY" one year, $3.50.

West's Molder's Text-Book, the second part of The American Foundry Practice, presents the best methods and original rules for obtaining good, sound, and clean castings, and gives a detailed description for making molds requiring skill and experience. It also contains a practical treatise upon the construction of cranes and cupolas, and the melting of iron and scrap-steel in iron foundries. By Thomas D. West. Contains 461 pages, fully illustrated. Price, $2.50 postpaid, with "THE FOUNDRY" one year, $3.50.

Casting and Founding is a practical treatise on casting and founding, including a description of the modern machinery employed in the art. By R. E. Spretson. It contains eighty-two plates drawn to scale and articles on pig-iron and some of its characteristics, furnace and fuel, measures of heat, fans and blowers, patterns, materials used in molding, malleable cast iron, case hardening, casting on other metals, crane ladles, bell founding, etc. Price, $6.00 postpaid, with "THE FOUNDRY" one year, $7.00

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The Iron Founder, a comprehensive treatise on the art of molding, including chapters on core-making; loam, dry-sand and green-sand molding; also crystalization, shrinkage and contraction of cast iron and a full explanation of the science of pressure in molds; added to which are formulas for mixtures of iron, tables, rules, and miscellaneous information, written by Simpson Bolland, a practical molder and manager of factories, is handsomely bound, contains fifty-eight chapters and 382 pages, and is illustrated with over three hundred engravings. It will be sent postpaid on receipt of price. Agents wanted in every city and town in America to whom a liberal commision will be paid. The right man can make money selling this work. Try it. Address, "THE FOUNDRY" 172 Griswold Street, Detroit, Michigan. Price $2.50; with "THE FOUNDRY" $3.50.

The A B C of Iron, by Charles W. Sisson, is the best work on the subject of iron that has ever yet been published and is especially valuable to foundry foreman, superintendents, melters, and buyers of Iron generally. Learn how to know the kind of iron your are using and how to mix it to an advantage, to get the strength, density, softness or hardness, etc., required. Its contents are iron—what is it?—A description of the metal and its uses, showing in what combinations it is found and the principal sources. Pig-iron. An account of the blast furnace process by which the ores are reduced to pig-iron. Constituents of iron.—A description of the elements in pig metal which influences cast iron. Described in chapters on carbon in cast iron, silicon in cast iron, phosphorus in cast iron, manganese in cast iron, sulphur in cast iron. Numbering of pig iron.—Showing the character and analysis of different grades of pig iron, apperance of fracture and the uses to which the several grades are adapted.—Grading of iron.—Should it be by analysis or by fracture? How to reduce the cost of mixture. Steel. Physical properties of metals defined.—Table of shrinkage of castings. Weights of castings from patterns, etc. Statistics.—Showing the varieties and productions of iron ore, pig iron, pig iron and steel products, railroad mileage and equipment, etc., etc., etc., Early history and manufacture of iron.—Brief history and uses of iron from earliest times, being principally extracts from Mr. James M. Swank's "History of Iron in all Ages." Price, $2.00 with "THE FOUNDRY" one year $3.00.

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EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustible stone quarries of every description: immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

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There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States.

The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATER UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world. Will appreciate any correspondence requesting information, etc.

This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

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FROM CHICAGO AND ST. LOUIS TO ST. PAUL, MINNEAPOLIS, OMAHA, KANSAS CITY, DENVER,

And all Points in Colorado, Utah and California.

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WASON STREET,

Between St. Clair and Superior Streets.

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Hand, Steam, Hydraulic and Electric Cranes,

FOR ALL PURPOSES.

FOUNDRY LADLES, CHAINS & GENERAL MACHINERY.

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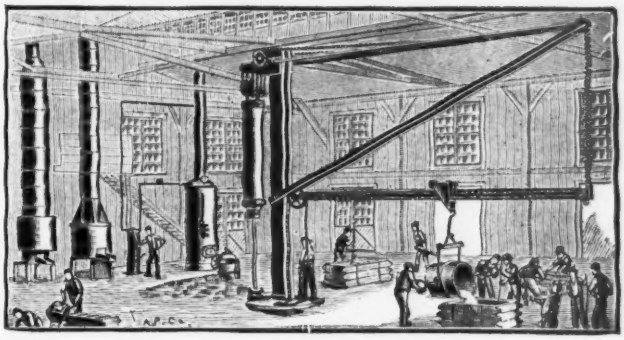
COMPRESSED AIR HOISTS. STEAM HYDRAULIC STOCK ELEVATORS.

Ridgway Balanced Steam Hydraulic Crane.



Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

THE GREATEST FOUNDRY CRANE KNOWN.

You will never know how good it is until you fully investigate it. Every New or Remodeled Foundry is "Missing it Bad" if they do not adopt this Crane.

One of the Largest Concerns in Cincinnati, Ohio writes:

"We estimate an efficiency of full 50 per cent. more work with the same wages upon floors they cover than by any old style crane and a far greater adaptability to floor work than overhead travelers would accomplish."

The Foreman of the Largest Foundry in Chicago in a letter to the Editor of THE FOUNDRY says:

"It is the Best Crane for a Foundry I ever saw or heard tell of."

It will be money in the pockets of every Foundry to throw away their present winding cranes of whatever type, hand or power, and put in these

Quick Acting and Sure Cranes.

This Crane uses such a trifling amount of steam that it need not be taken into account, even on the most limited supply. The steam used is never missed. The most economical power user known.

Give steam, air or water pressure, height to square of building, radius and capacity and we will *name satisfactory prices. Send for circulars.*

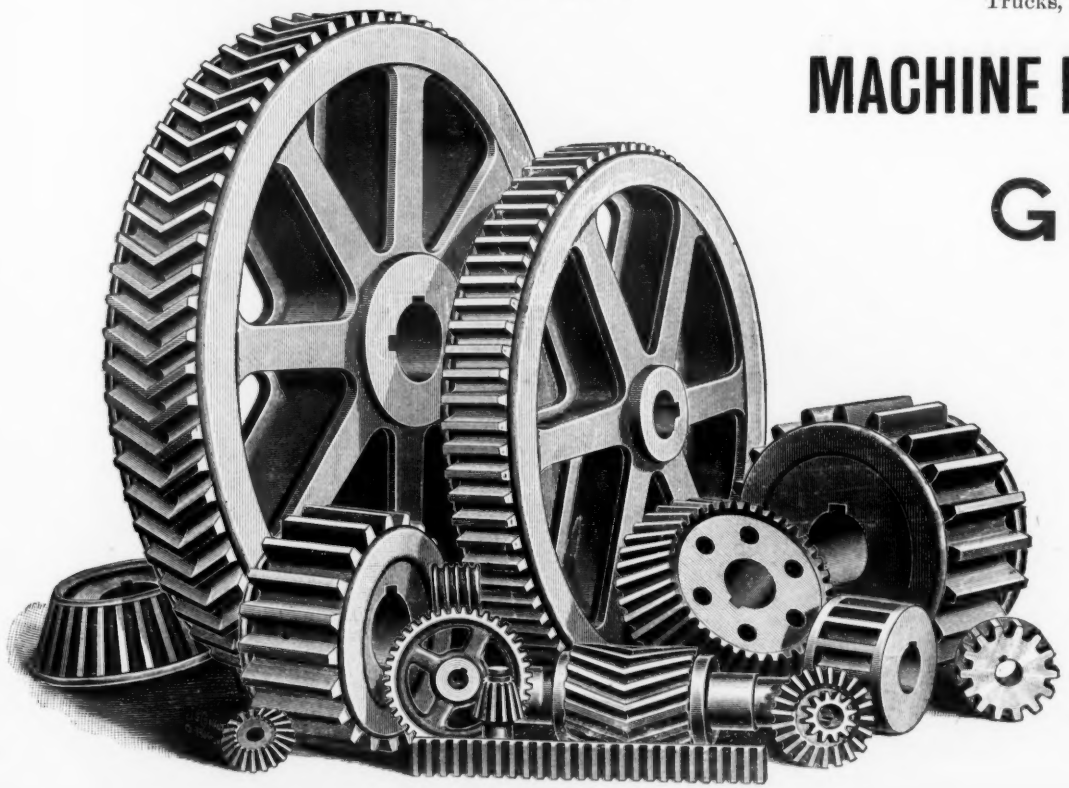
CRAIG RIDGWAY & SON,

COATESVILLE, PENN.

THE WALKER MFG. Co

ENGINEERS, FOUNDERS and MACHINISTS,

CLEVELAND, OHIO, U. S. A.



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COMPLETELY EQUIPPED.

Cranes, Cupolas, Ladles, Sand Sifters, Core Oven Trucks, Rumbling Mills, Hydraulic Elevators, Blowing Engines, Etc.

MACHINE MOLDED PULLEYS
AND
GEARS
A Specialty.

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IN Accuracy of Pitch, Definition of Form, and Smoothness of Surface, Gears produced by our Patented Machinery are beyond compare. Moreover, extensive experience and scientific experiment, enables us to make our castings of a grade of iron perfectly adapted for strong, durable, Gears. During the last ten years thousands of our Gears have been sent to all parts of the United States, and have given universal satisfaction.

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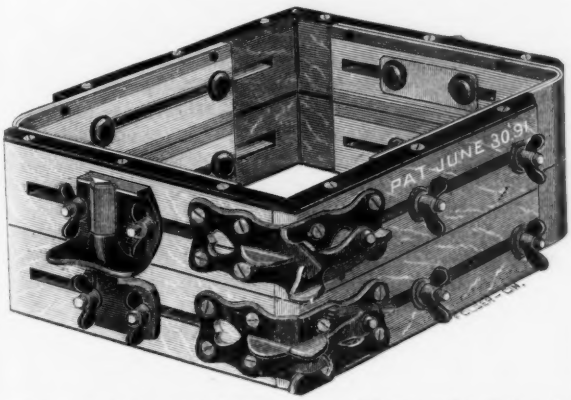
The Adjustable Snap Flask Co.,

LIBERTY, UNION CO. IND.

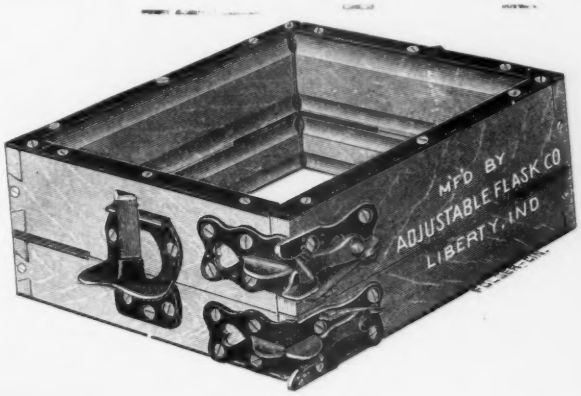
The Combination Adjustable Snap Flask.

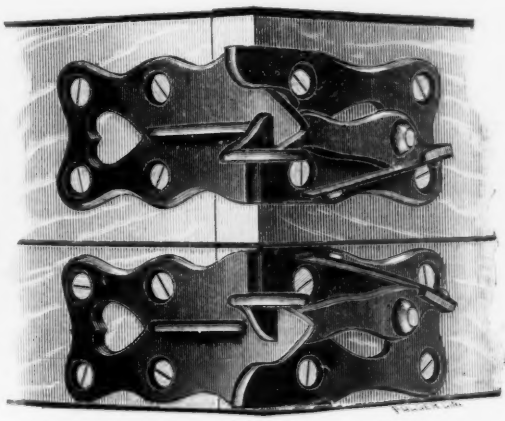


We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.





AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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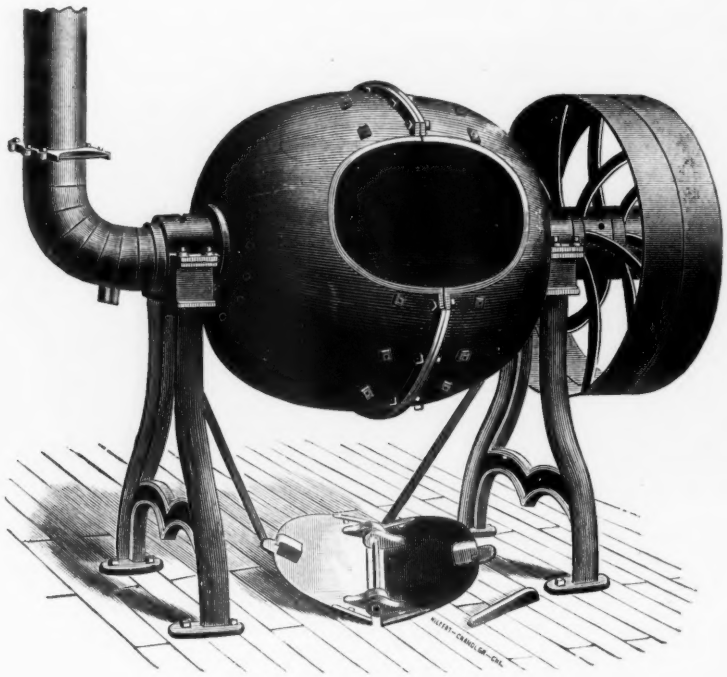

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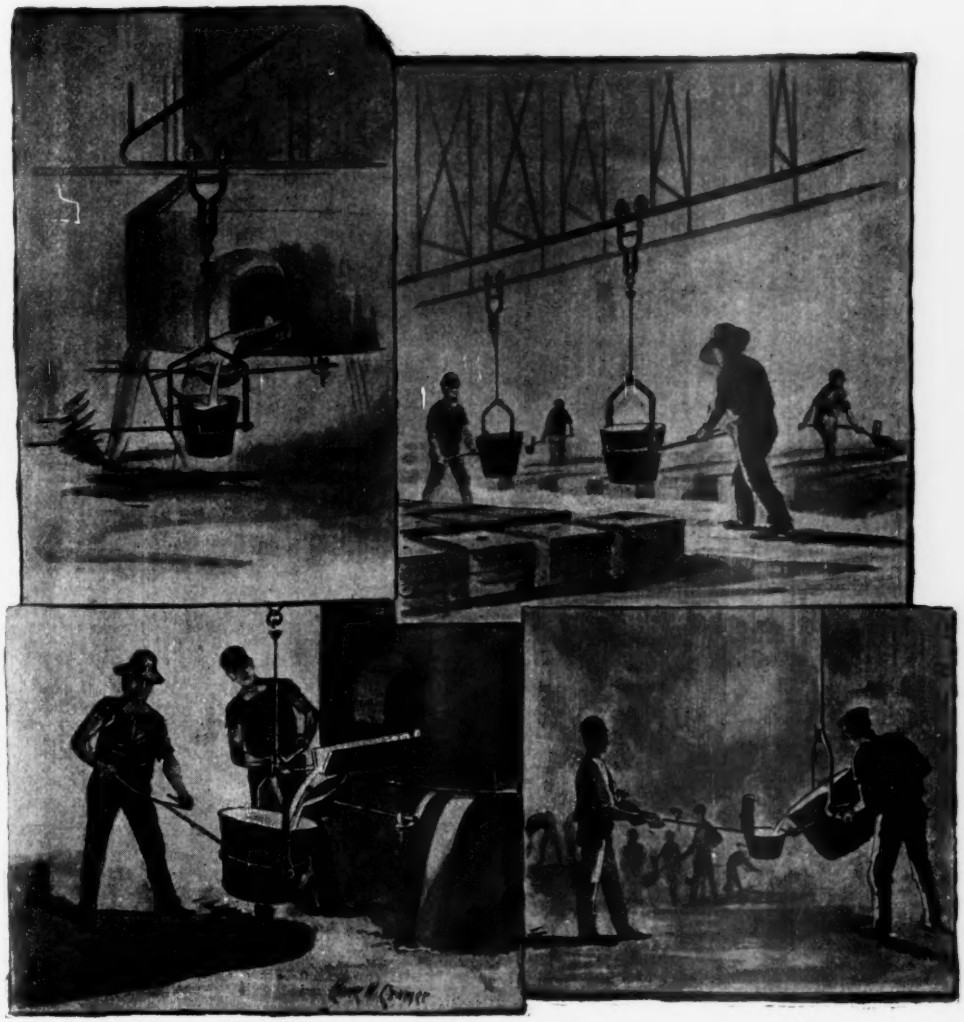

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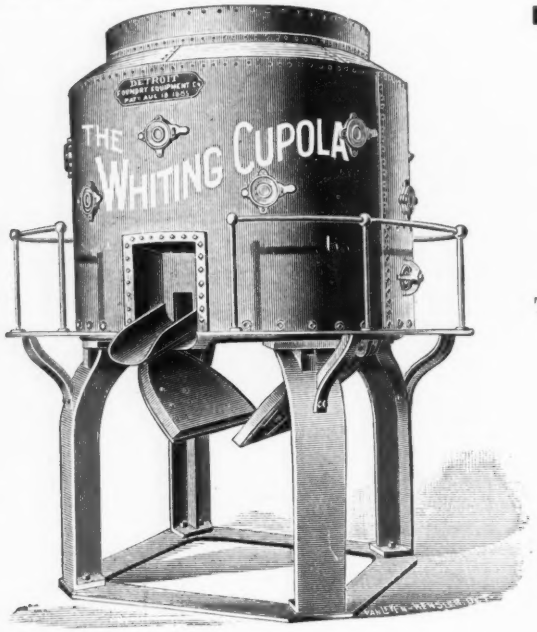

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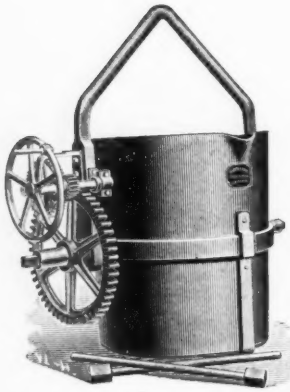

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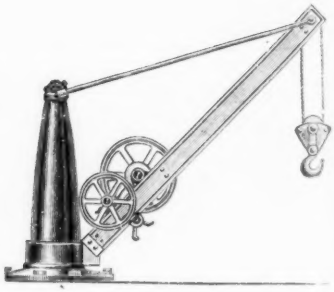

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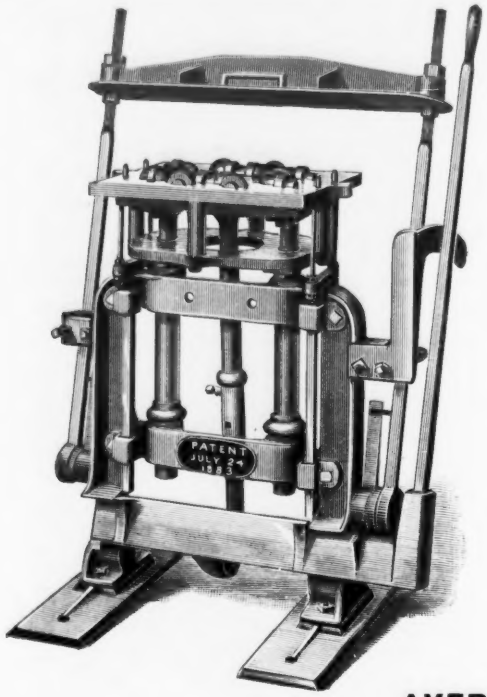

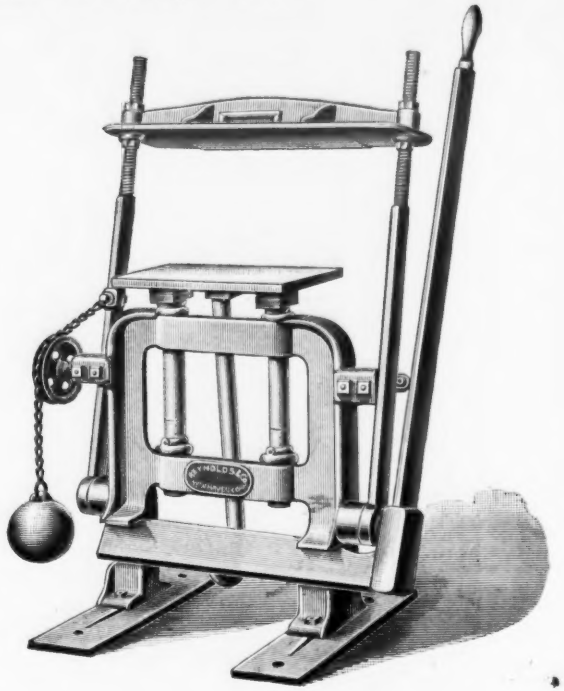

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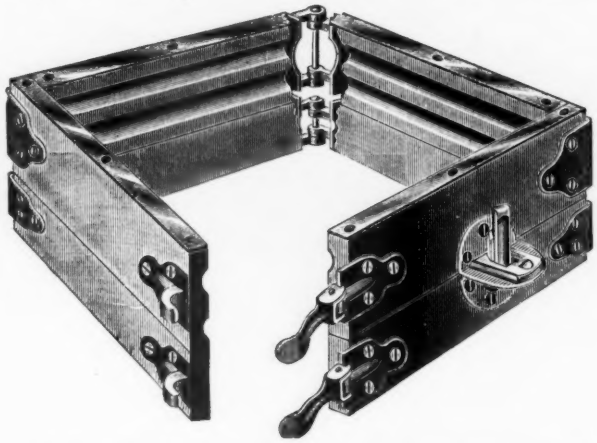

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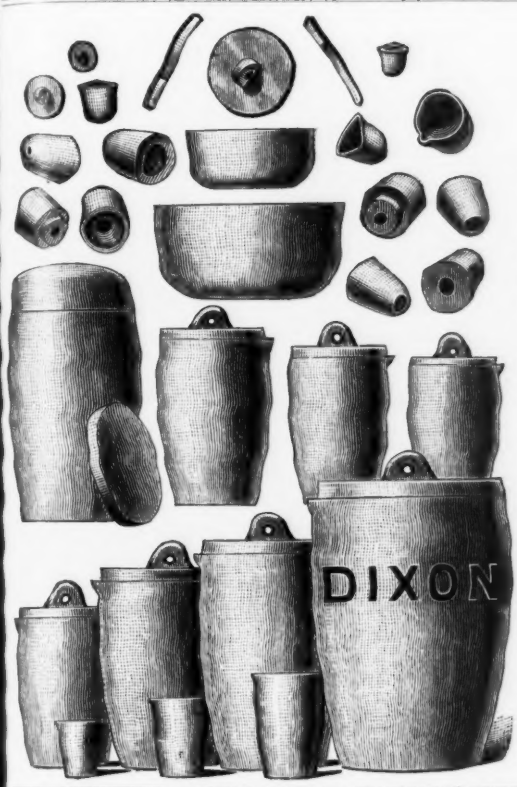

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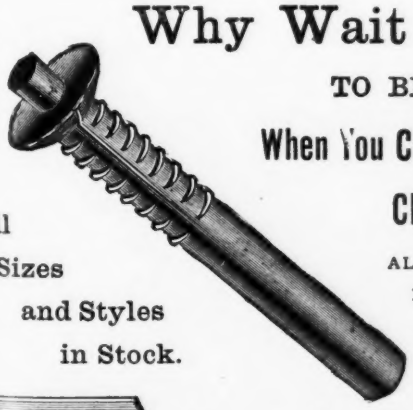

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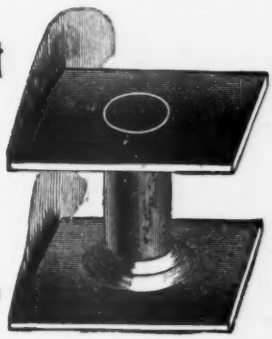

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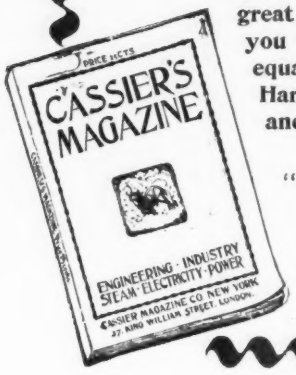

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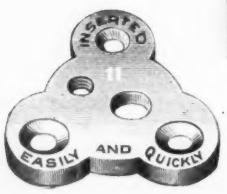

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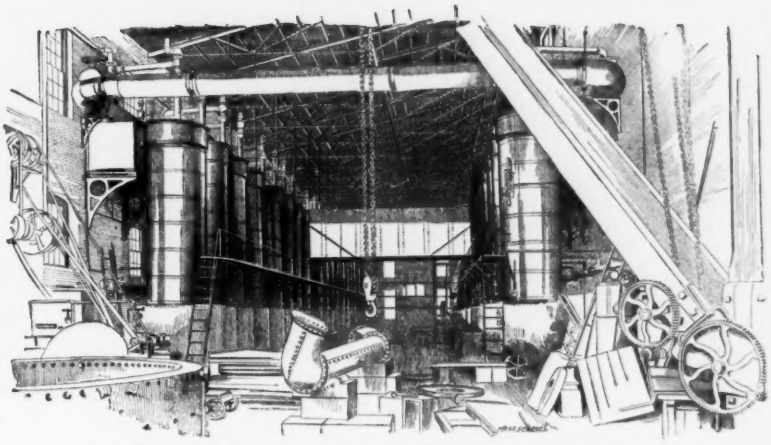

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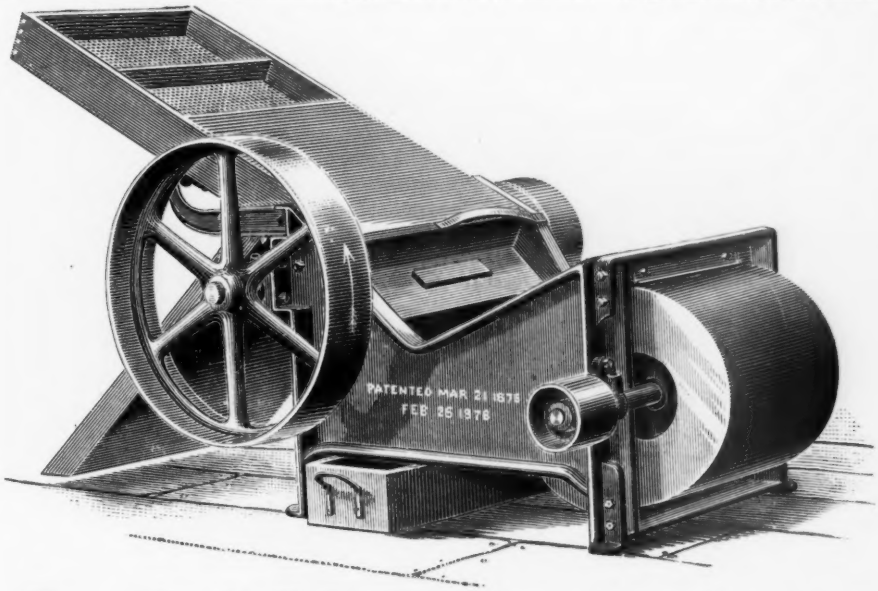

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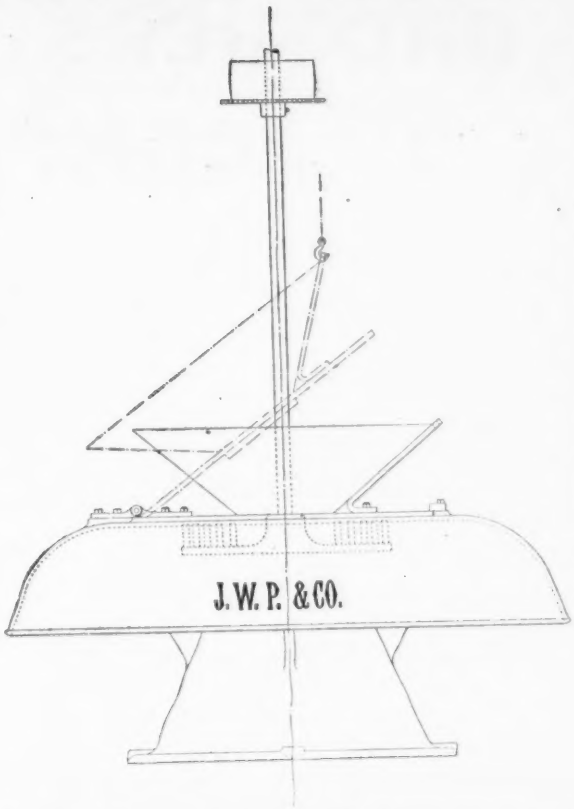

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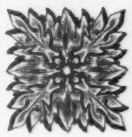
Puzzle to Our Competitors,
Wash We are Proud of,
Wash YOU would not be without
if you KNEW ITS VALUE.



ROBERT SMACK & CO., Iron Founders.

New York, Feb. 11th, 1893.

Cleveland Facing Mills, Cleveland, O.

Gentlemen:—Please ship us on as soon as possible, 1,000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We finds it works better than anything we have ever used.

Yours truly,
Robert Smack & Co.

New York City, April 12th, 1893.

Cleveland Facing Mills, Cleveland, O.

Dear Sirs:—Please ship us on as quickly as possible 1,000 lbs. C. F. M. Founders' Perfect Wash. Your Wash can't be beat.

Very truly yours,
Robert Smack & Co.
Pr. Sam'l J. Smack.

THE BLACK & CLAWSON CO.

Hamilton, O., March 29th, 1893.

Cleveland Facing Mills, Cleveland, O.

Gentlemen:—A short time ago you sent us a sample order, one bbl. core wash, which pleased us, and we now wish you to send us 10 more bbls. of the same article.

Yours truly,
The Black & Clawson Co.

BELL & FYFE FOUNDRY CO.

Brooklyn, N. Y., March 15th, 1893.

Order No. 689, Cleveland Facing Mills.

Please ship and note on invoice our Order Number, the following, 2 bbls. "C. F. M. Founders' Wash." Same as sent on bill Dec. 12th, 1892.

Bell & Fyfe Foundry Co.

FRASER & CHALMERS, Fulton and Union Streets.

Chicago, Nov. 28th, 1892.

Messrs. Cleveland Facing Mills, Cleveland, O.

Gentlemen:—Replying to your favor of the 18th, concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he ever used.

Yours truly,
H. P. Young, Purchasing Agent.

Use our Wash, you will then have little use for Casting Brushes or Scrapers.

Especially adapted for Loam, Dry Sand and Skin Dried Castings. For Cores of any description. For Green Sand Work, when it can be rubbed in with the hand, or applied with a camel's hair brush.

No experiment, the fact is established that C. F. M. Wash is far superior to any other Foundry foremen from all parts of the country speak warmly of its merits.

We manufacture all kinds. Foundry Facings, Blackings, India Silver Leads, North Carolina Talc. Special facilities for grinding Seacoal Facing. Write—Your wants will have immediate attention.

CLEVELAND FACING MILLS,

THE FOUNDRY. CLEVELAND, OHIO.

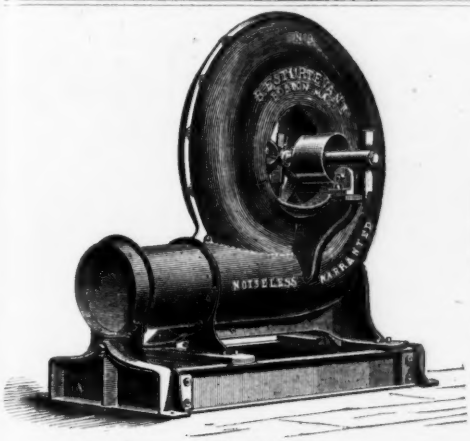
Did You Ever See Nice a Stove Made East?

ALL USE

New England Burned Charcoal.

WE SELL IT.

Springfield Facing Co.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

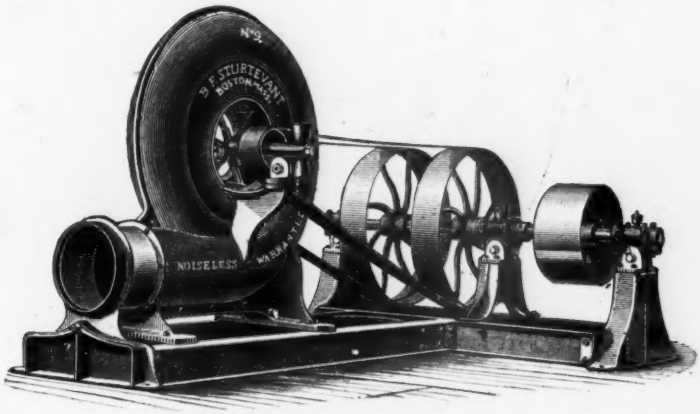
—FOR—

Cupola Furnaces and Forge Fires.

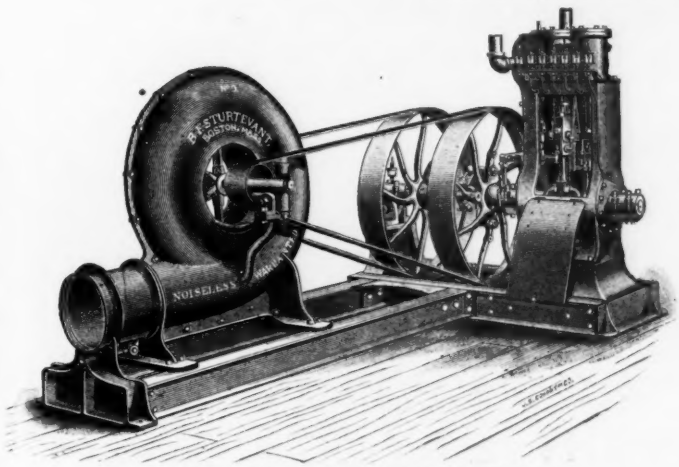
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors.

Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Buffalo Steel Pressure Blower

FOR CUPOLA FURNACES, FORGE FIRES, ETC., ETC.

—BUILT ON—

Adjustable Bed Combined with Countershaft,

—ALSO WITH—

DOUBLE UPRIGHT ENCLOSED ENGINE.

BUFFALO FORGE CO.,

Send for Catalogue "F" 1892. BUFFALO, N. Y.

OFFICE OF
ST. LOUIS IRON & MACHINE WORKS
ESTABLISHED 1854
INCORPORATED 1875
IRON FOUNDERS
OFFICE & WORKS,
MAIN ST. & CHOUTEAU AVE.
AND BUILDERS OF HEAVY MACHINERY

St. Louis Mo April 27th 1893

Huyett and Smith Mfg Co
Detroit, Mich

Gentlemen:

The Smith Hot Blast Heating apparatus which we purchased of you about two years ago has been in operation the past two winters and has heated our works to our entire satisfaction.

The past winter has been a very severe one, the temperature has often been below zero, yet we have only used exhaust steam from one of our 14" x 36" Corliss Engines used to operate our works. Our shops contain nearly one million cubic feet of space.

Yours very truly
St Louis Iron & Mach Wks
by H. Kinkzod V.P. & Mgr

Do Not Read the Above Letter unless you want the Best Heating and Ventilating Apparatus on the Market. The one referred to is a No. 80 SMITH PATENT HOT BLAST APPARATUS

MANUFACTURED BY

The Huyett & Smith M'f'g Co.

DETROIT, MICH.

CHICAGO: 31 So. Canal St. BOSTON: 48 Union St. NEW YORK: 107 Liberty St

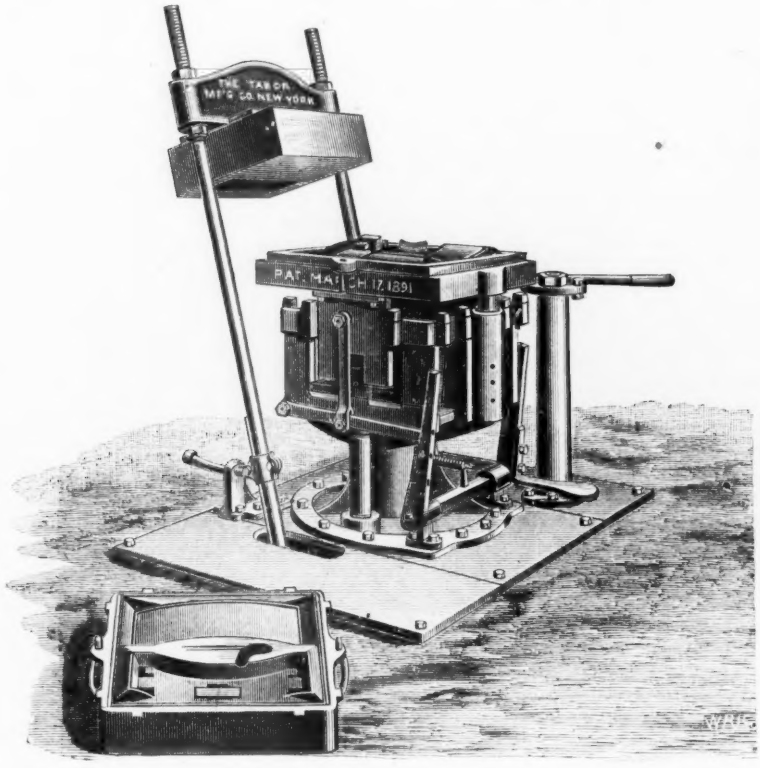
CATALOGUES, PLANS AND ESTIMATES FURNISHED FREE UPON APPLICATION.

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

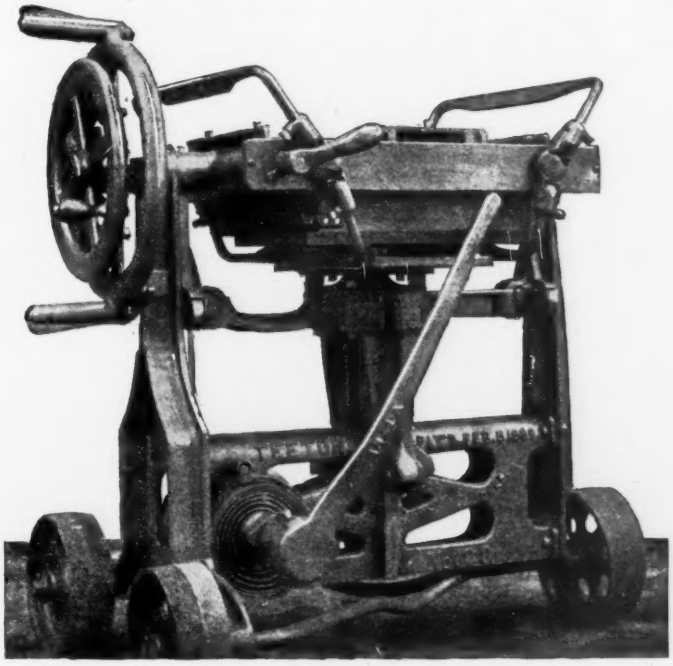
Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

111 and 113 Liberty Street,

NEW YORK, - - - N. Y.

Teetor Molding Machine

Large numbers are in use in some of the principal Foundries in the Country.



A Great Expense Saved

Nine-tenths of all patterns operated on the Teetor Molding Machine are molded without stripping plates. The convenience of changing patterns is commented on by a number of parties using our machine.

MANUFACTURED BY

Teetor Molding Machine Co

WRITE FOR CATALOGUE, TESTIMONIALS, ETC.

MENTION THE FOUNDRY. INDIANAPOLIS, IND.

Wrought Iron Bridge Co.,

DESIGNERS AND BUILDERS IN

IRON AND STEEL

Fire Proof Buildings

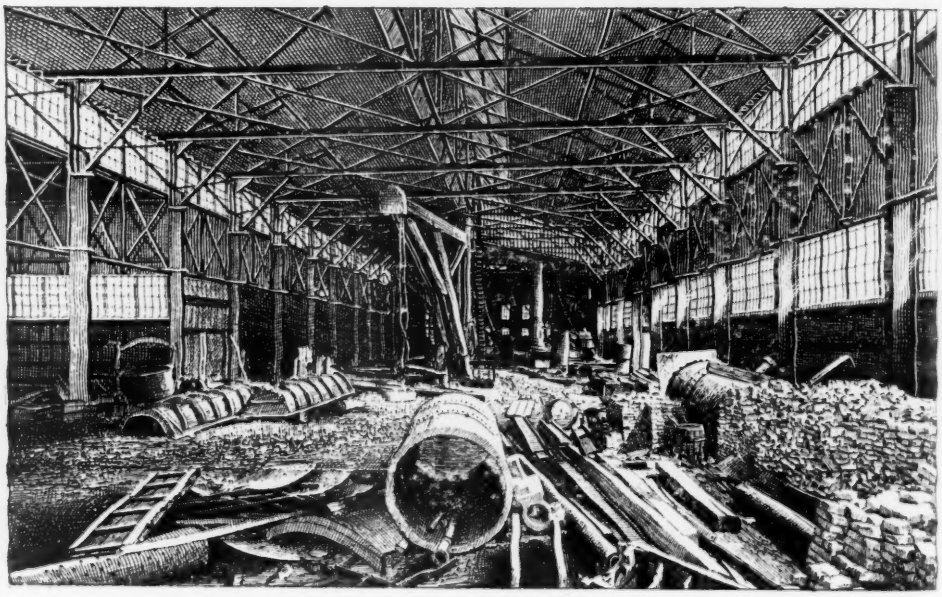
—FOR—

Foundries, Machine Shops.

ETC., ETC.

BUILDINGS DESIGNED FOR SPECIAL REQUIREMENTS.

Traveling and Jib Cranes for handling Heavy Castings and Machinery.



The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

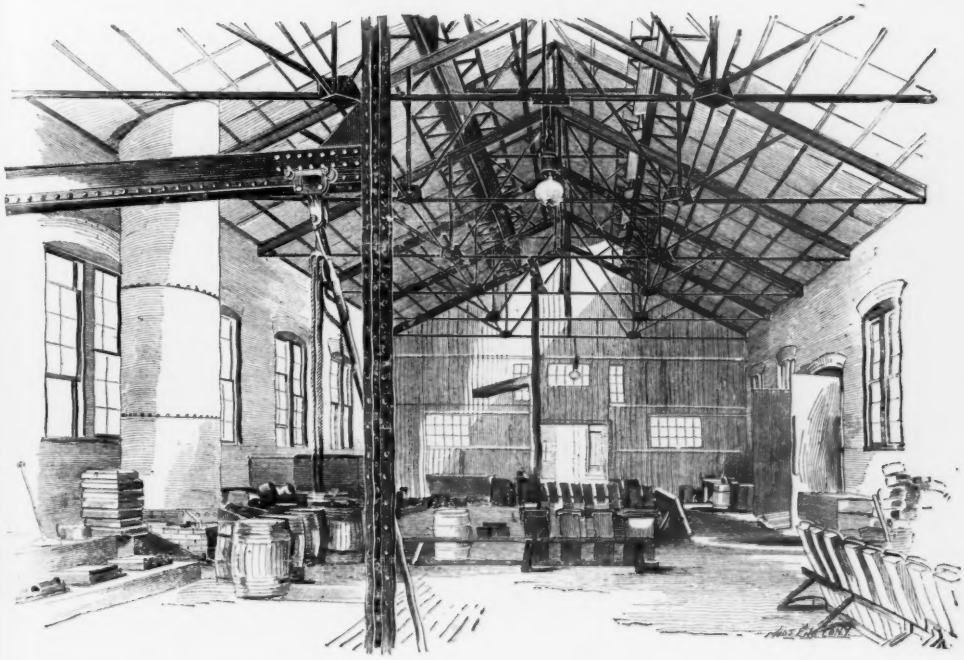
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary. F. L. WILCOX, Treasurer.

The Berlin Iron Bridge Co.

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken from a photograph, and shows the interior of a brass foundry *designed and built by us for Randolph & Clowes, at Waterbury, Conn.* The building is 42 ft. in width and 83 ft. in length with brick walls and an Iron Truss Roof covered with our patent Anti-Condensation Corrugated Iron Roof Covering, which is guaranteed not to sweat or condense moisture on the outside in the coldest weather. The building *is ventilated by our Improved Ventilator on* the ridge with Corrugated Iron Shutters opening and closing by cords from the floor.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

ESTABLISHED 1873.

THISTLE BRAND
Anti-Friction Metal.

In Use Everywhere and endorsed as being Unexcelled.

Read what W. & A. Fletcher Company, the leading Marine Engine Builders of New York say:

W. & A. FLETCHER COMPANY,
NORTH RIVER IRON WORKS
Hudson St., 12th to 14th Sts.

Hoboken, N. J. Oct. 12th 1891

Mr David Wilson

Dear Sir

In answer to yours enquiring for our opinion of your Anti-friction White Metal. We would state that We have used it in a number of cases for the past two years and always with entire Satisfaction — We consider it excellent in quality and have no hesitation in recommending its use whenever Anti-friction metal is needed.

Yours Respectfully
W. & A. Fletcher Co's
A. Fletcher Pres.

—INVALUABLE FOR—

Steel Mills, Pressure Blowers, High Speed Engines, Dynamos, Saw Mills, Rolling Mills, Sugar Mills, Steamships, Flour Mills and all Machinery Bearings.

Brass Composition and Bronze Castings. Address

DAVID WILSON,

510 and 512 West Thirty-Third Street, - NEW YORK.

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Burlington Route

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Kansas City, St. Joseph & Council Bluffs R. R.
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Chicago, Burlington & Kansas City Ry.

Over 7,000 Miles of Railroad Under One Management.

MANUFACTURERS contemplating the removal of their plants or the building of branch ones in the West are urgently requested to communicate with the undersigned.

OPPORTUNITIES, RESOURCES, ASSISTANCE.—THE BURLINGTON ROUTE reaches with its own line nearly every place of note in ILLINOIS, IOWA, MINNESOTA, MISSOURI, NEBRASKA, KANSAS, DAKOTA, WYOMING, COLORADO, and has direct connections to every point in America.

EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustible stone quarries of every description: immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

MANUFACTURERS, OR OTHERS, desiring any information regarding Materials, Accessibility to Markets, Best Cities and Towns to locate in, what these places offer as inducements, etc., will do well to write for information.

There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States.

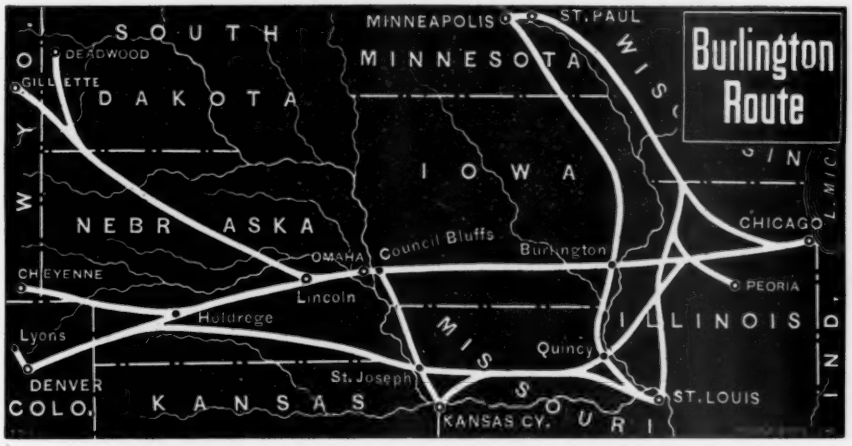
The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATER UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world Will appreciate any correspondence requesting information, etc.

This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

THE BEST RAILWAY.



FROM CHICAGO AND ST. LOUIS TO ST. PAUL, MINNEAPOLIS, OMAHA, KANSAS CITY, DENVER,

And all Points in Colorado, Utah and California.

P. S. EUSTIS, Gen'l Pass'r and Ticket Agent,

CHICAGO, ILLINOIS.

MAP OF THE UNITED STATES

A large, handsome Map of the United States, mounted and suitable for office or home use, is issued by the Burlington Route. Copies will be mailed to any address on receipt of twelve cents in postage by P. S. EUSTIS, Gen'l Pass. Agt., C., B. & Q. R. R., Chicago, Ill.

PLAYING CARDS

You can obtain a pack of best quality playing cards by sending fifteen cents in postage to P. S. EUSTIS, Gen'l Pass. Agt., C., B. & Q. R. R., Chicago, Ill.

T. H. BROOKS, Pres. W. H. SHEPARD, Vice-Pres & Treas. L. C. SHIPHERD, Sec'y.
W. RUSSELL, Mgr.

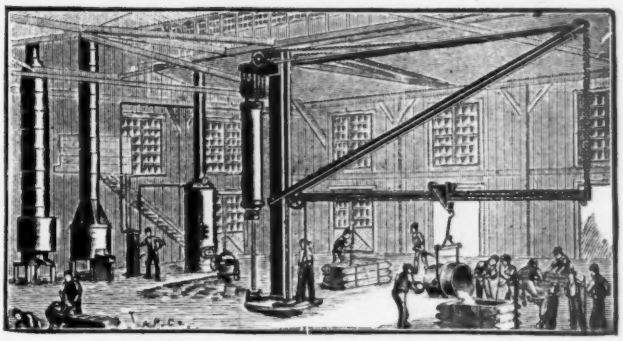
The Phœnix Iron Works Co.

WASON STREET,
Between St. Clair and Superior Streets.
CLEVELAND, - - OHIO.

MANUFACTURERS OF
Hand, Steam, Hydraulic and Electric Cranes,
FOR ALL PURPOSES.
FOUNDRY LADLES, CHAINS & GENERAL MACHINERY.
Correspondence Solicited. Write for Catalogue.

COMPRESSED AIR HOISTS. STEAM HYDRAULIC STOCK ELEVATORS.

Ridgway Balanced Steam Hydraulic Crane.



Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

THE GREATEST FOUNDRY CRANE KNOWN.

You will never know how good it is until you fully investigate it. Every New or Remodeled Foundry is "Missing it Bad" if they do not adopt this Crane.

One of the Largest Concerns in Cincinnati, Ohio writes:

"We estimate an efficiency of full 50 per cent. more work with the same wages upon floors they cover than by any old style crane and a far greater adaptability to floor work than overhead travelers would accomplish."

The Foreman of the Largest Foundry in Chicago in a letter to the Editor of THE FOUNDRY says:

"It is the Best Crane for a Foundry I ever saw or heard tell of."

It will be money in the pockets of every Foundry to throw away their present winding cranes of whatever type, hand or power, and put in these

Quick Acting and Sure Cranes.

This Crane uses such a trifling amount of steam that it need not be taken into account, even on the most limited supply. The steam used is never missed. The most economical power user known.

Give steam, air or water pressure, height to square of building, radius and capacity and we will name satisfactory prices. Send for circulars.

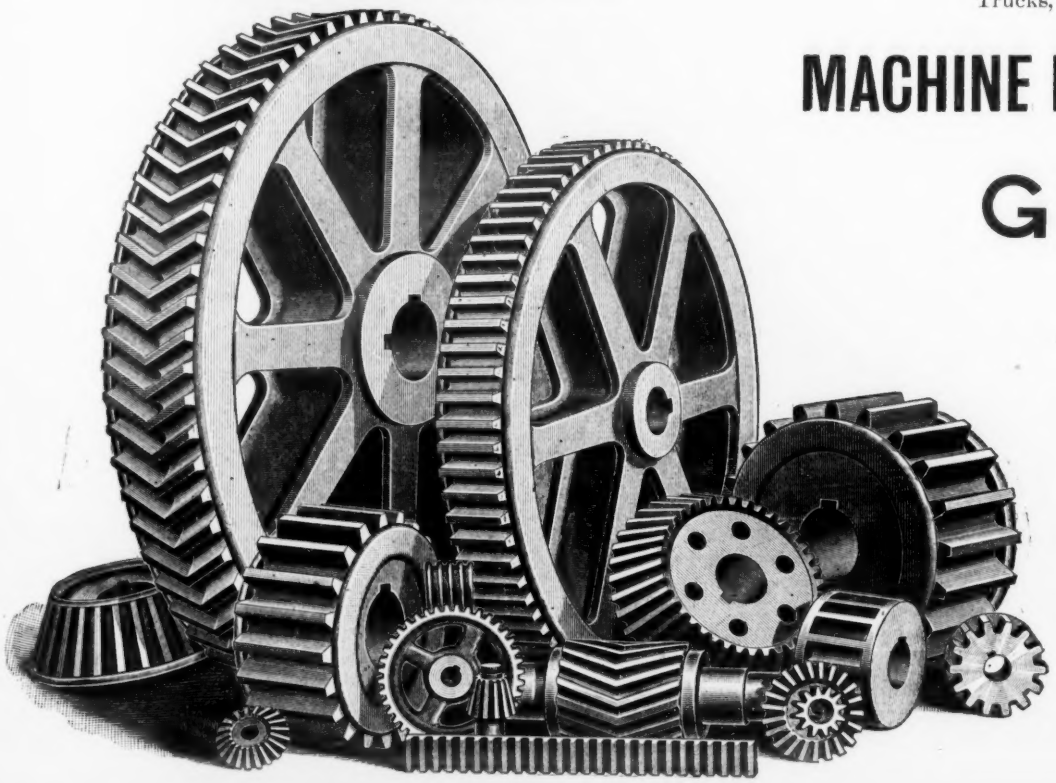
CRAIG RIDGWAY & SON,

COATESVILLE, PENN.

THE WALKER MFG. Co

ENGINEERS, FOUNDERS and MACHINISTS,

CLEVELAND, OHIO, U. S. A.



FOUNDRIES
COMPLETELY EQUIPPED.

Cranes, Cupolas, Ladles, Sand Sifters, Core Oven Trucks, Rumbling Mills, Hydraulic Elevators, Blowing Engines, Etc.

MACHINE MOLDED PULLEYS
AND
GEARS
A Specialty.

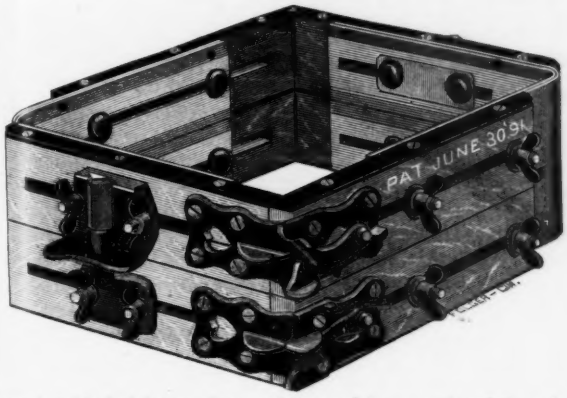
IN Accuracy of Pitch, Definition of Form, and Smoothness of Surface, Gears produced by our Patented Machinery are beyond compare. Moreover, extensive experience and scientific experiment, enables us to make our castings of a grade of iron perfectly adapted for strong, durable, Gears. During the last ten years thousands of our Gears have been sent to all parts of the United States, and have given universal satisfaction.

CORRESPONDENCE SOLICITED.

The Adjustable Snap Flask Co.,

LIBERTY, UNION CO. IND.

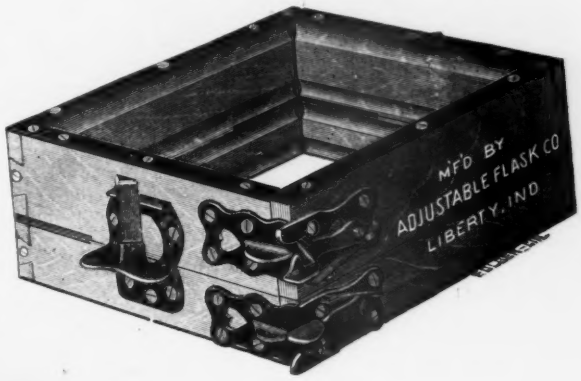
The Combination Adjustable Snap Flask.

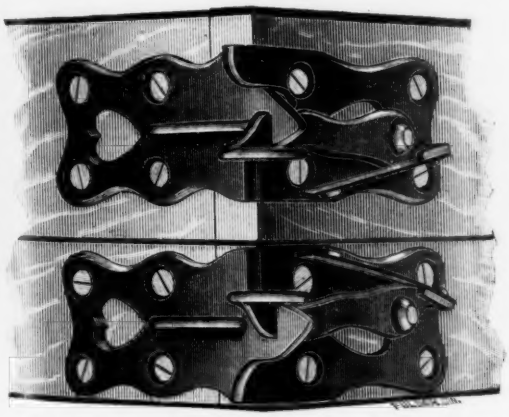


We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is especially adapted for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch, and is also fitted with adjustable eyes and malleable corner pieces, the latter features of which are not shown in accompanying cut.





AUTOMATIC LATCH.

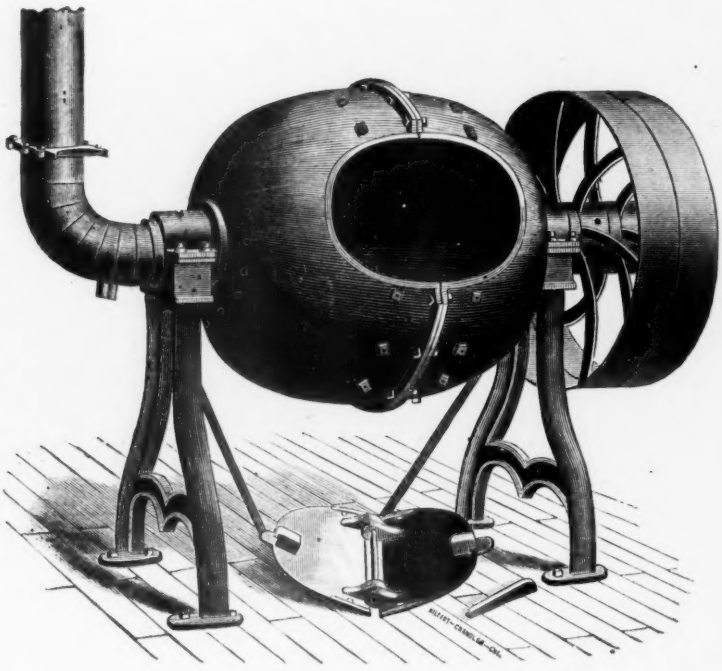
Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

Write for Catalogue. Prices and Terms sent on Application.

FOR SALE BY ALL OF THE LEADING FOUNDRY SUPPLY DEALERS.

Stover's Improved

Exhaust Tumbling Barrel



The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of Barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron, wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address

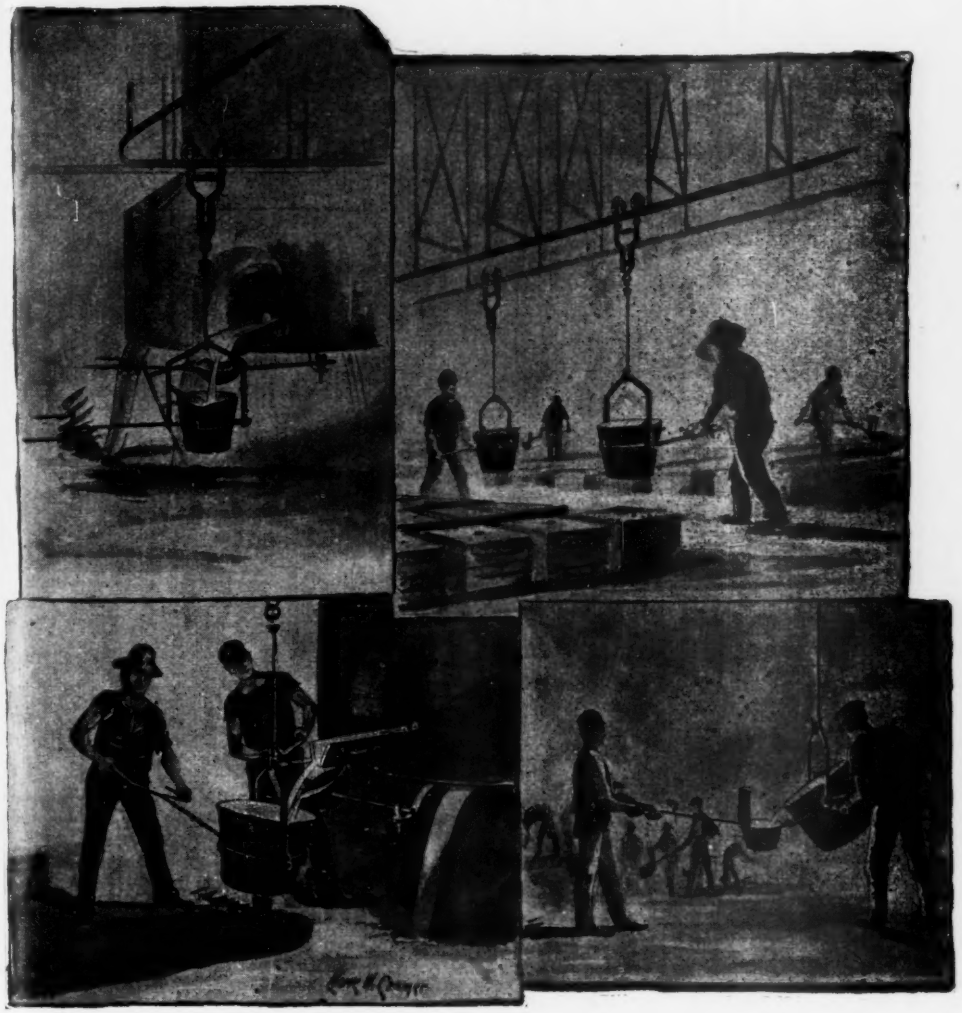
Stover Manufacturing Co.,

205 RIVER STREET,

FREEPORT, ILL

Mention THE FOUNDRY.

Hayes' Patent Iron Carrier.



The most complete Labor Saving device for facilitating the rapid handling of large quantities iron ever placed on the market.

Just the thing for Stove, Architectural, Car and in fact all kinds of foundries where it is necessary to have "rapid transit" of iron from cupola to mold. Will save its cost in six months in labor to say nothing of better castings, convenience and economy in material. For full information, cost, etc. Address,

LEWIS MILLER,

CARE AULTMAN, MILLER & CO. AKRON, O.

The Grenier Economical Cupola.

OVER 500 IN USE.

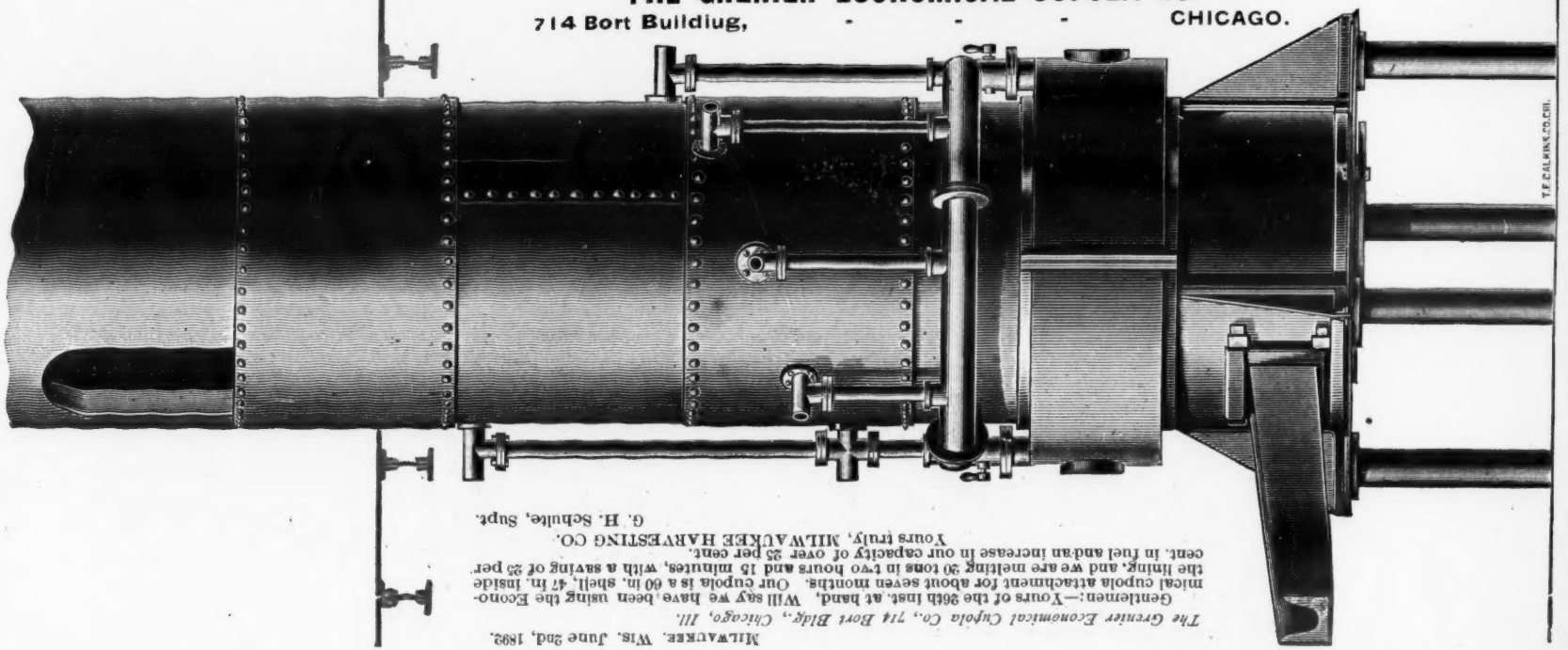
CUPOLAS BUILT OR

"SYSTEM APPLIED TO ANY CUPOLA."

15 per cent. Saving in Fuel Guaranteed. Write,

THE GRENIER ECONOMICAL CUPOLA CO.

714 Bort Building, - - - CHICAGO.



MILWAUKEE, Wis. June 2nd, 1892.

The Grenier Economical Cupola Co., 714 Bort Bldg., Chicago, Ill.

Gentlemen:—Yours of the 26th inst. at hand. Will say we have been using the Economical cupola attachment for about seven months. Our cupola is a 60 in. shell, 47 in. inside the lining, and we are melting 30 tons in two hours and 15 minutes, with a saving of 25 per cent. in fuel and an increase in our capacity of over 25 per cent.

Yours truly, MILWAUKEE HARVESTING CO.

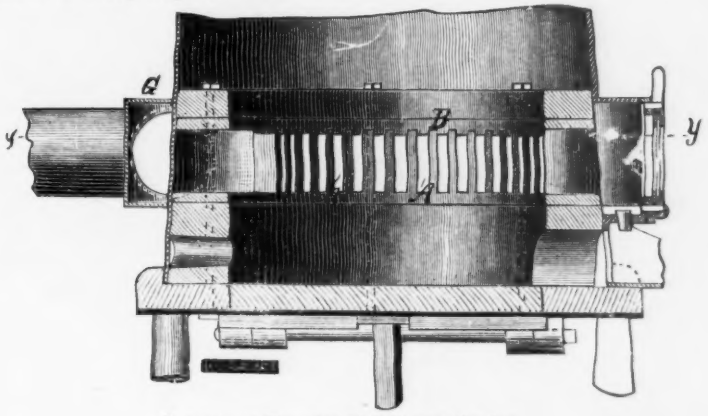
G. H. Schulte, Supt.

T.F. CALKINS, CO. CHI.

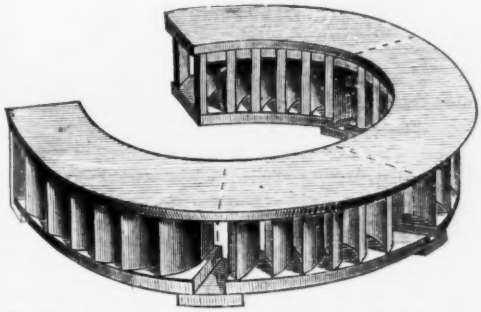
The Blakeney Cupola Furnace

IS GUARANTEED

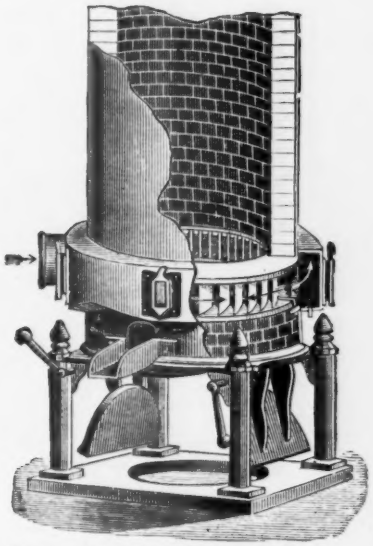
To be more Economical; To Melt Faster; To produce Iron of a more Uniform Grade and Strength; To be entirely Free from Clogging; To have the most perfect Combustion; To be Lower in price than any Cupola on the Market. If you wish to improve your Melting Facilities, it will pay you to investigate our Illustrated Catalogue and Price List. Sent Free. Has been Adopted by the U. S. Navy Department.



Sectional Elevation of the Lower Portion.



The Combination of Sections of Tuyeres as placed in wall.



Sectional View of Blakeney Cupola Furnace.

The Springfield Cupola Co.

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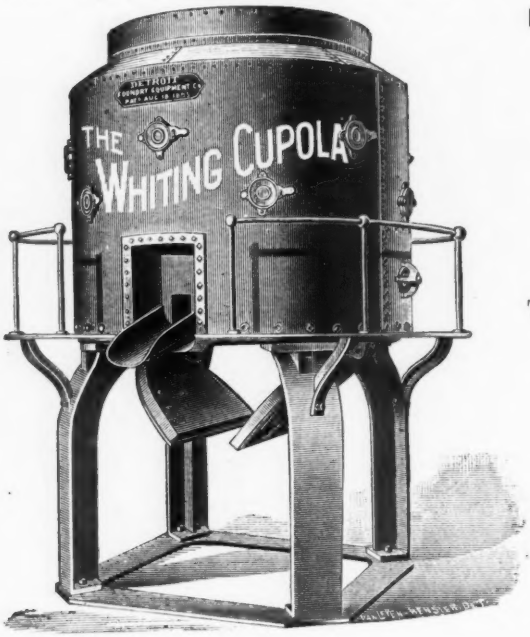

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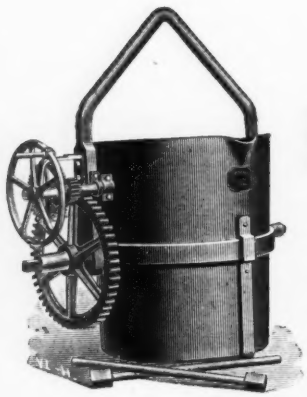

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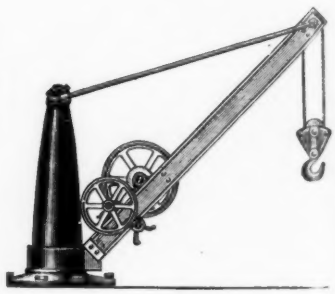

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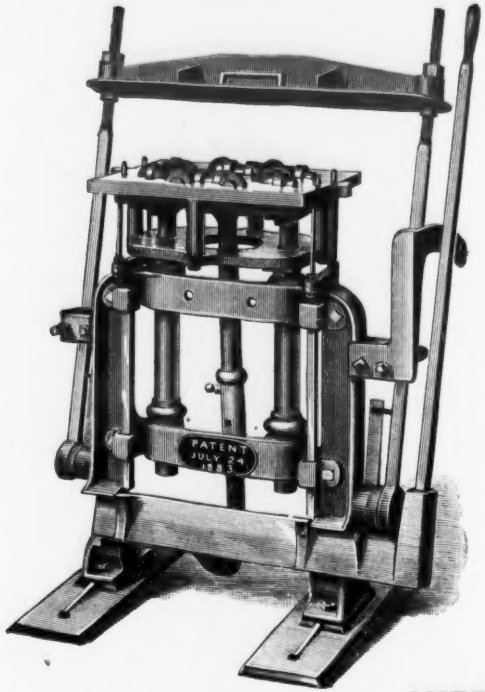

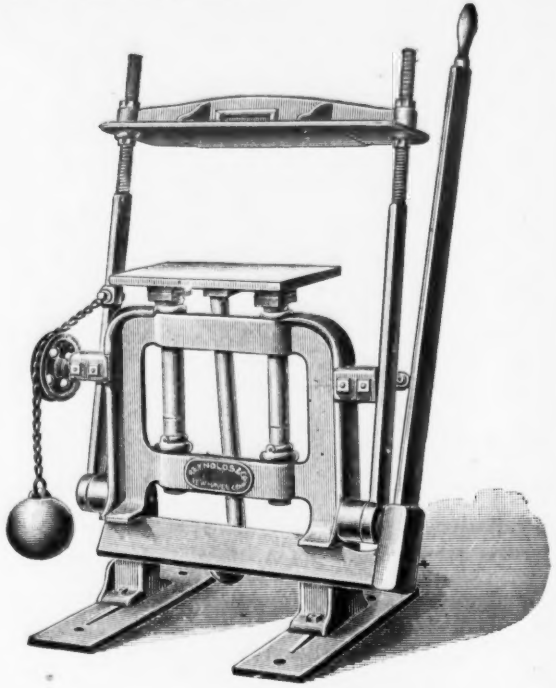

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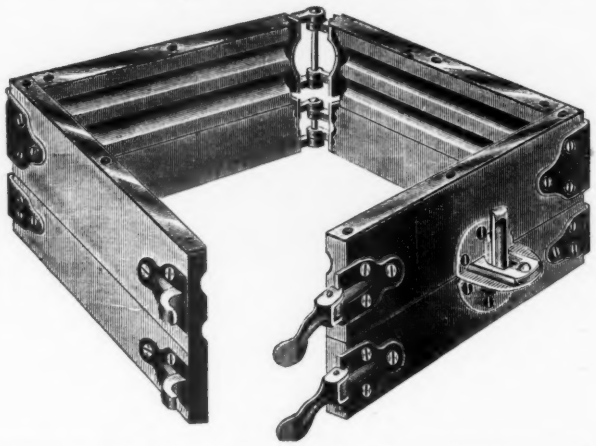

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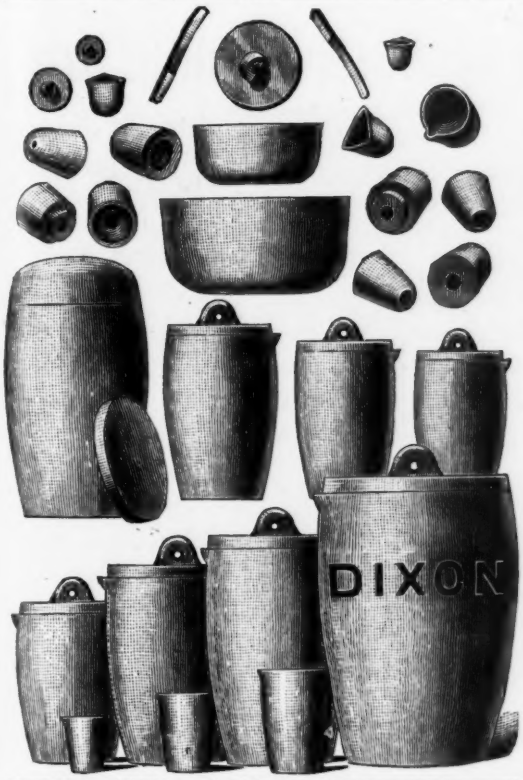

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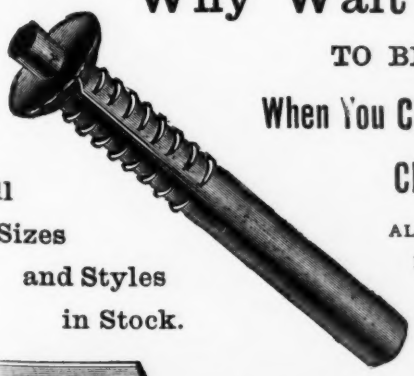

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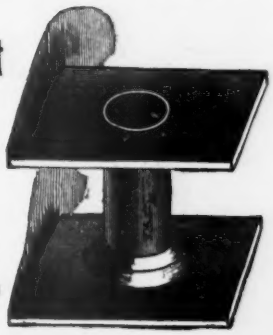

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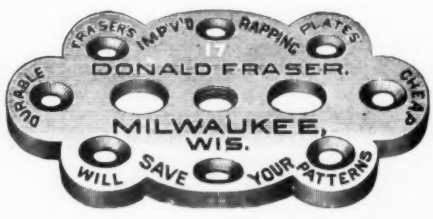
E É  Ó N

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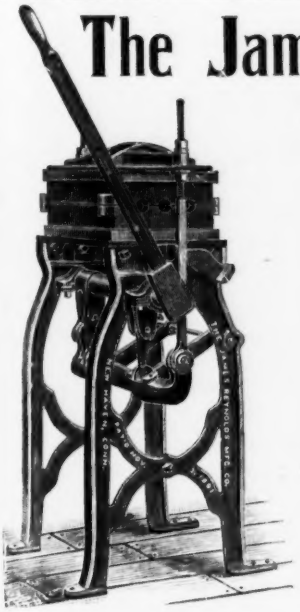

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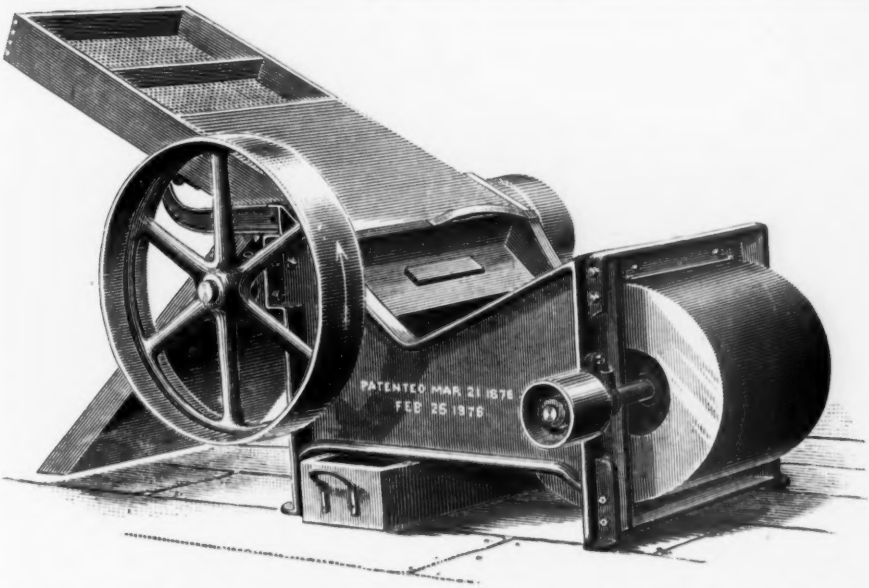

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OUR SPECIALTIES ARE:

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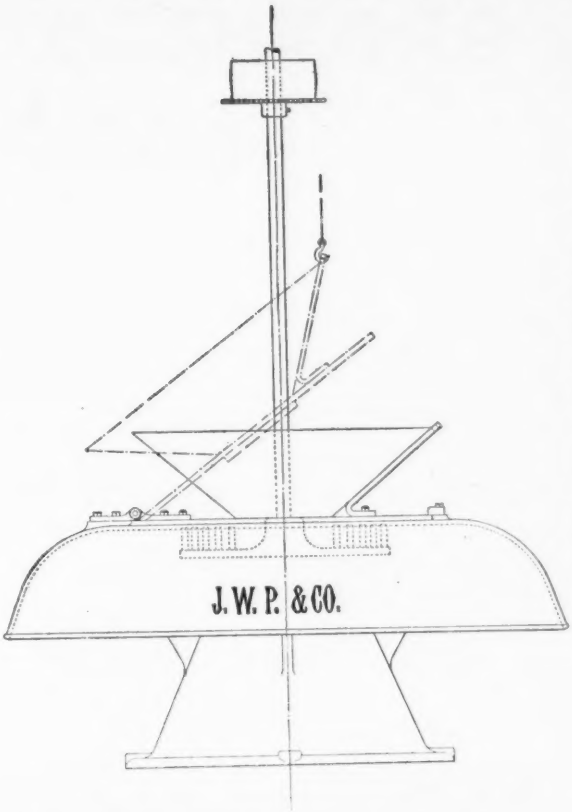

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A Wonder to our Customers,
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Wash We are Proud of,
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Gentlemen:—Please ship us on as soon as possible, 1,000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We finds it works better than anything we have ever used.

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Dear Sirs:—Please ship us on as quickly as possible 1,000 lbs. C. F. M. Founders' Perfect Wash. Your Wash can't be beat.

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Pr. Sam'l J. Smack.

THE BLACK & CLAWSON CO.

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The Black & Clawson Co.

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Bell & Fyfe Foundry Co.

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THAN ANY OTHER NOW ON THE MARKET.

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Especially adapted for all purposes requiring a FORCED BLAST.

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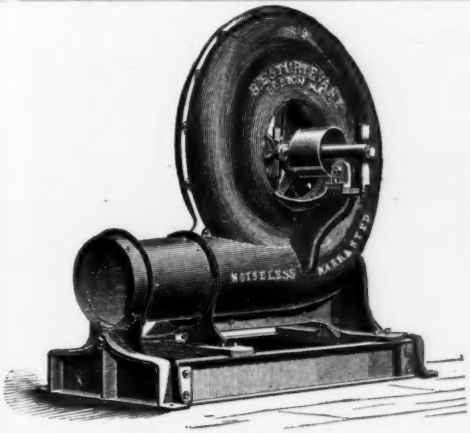

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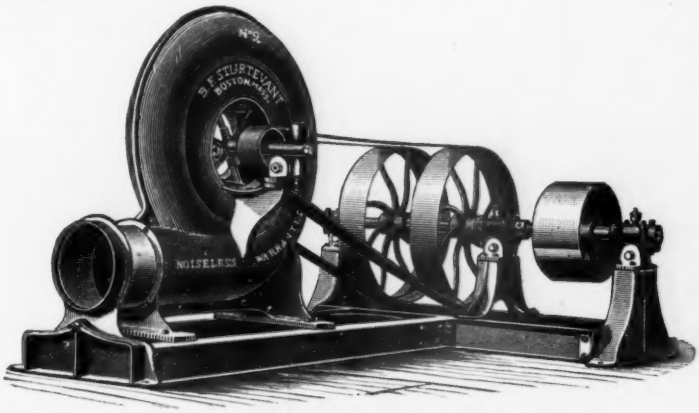

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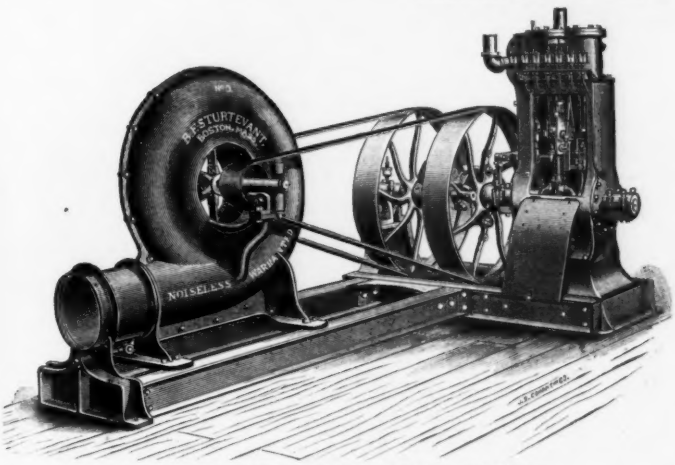

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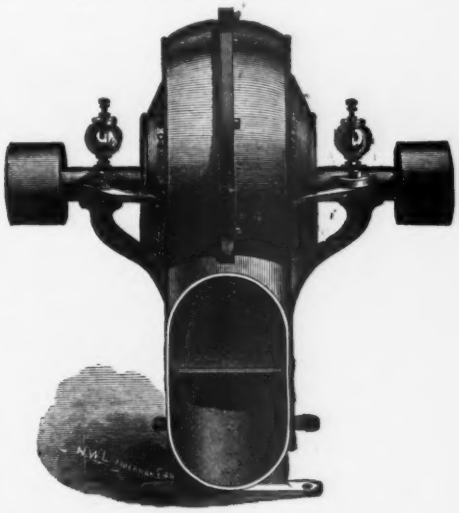
All Sizes Kept in Stock.

Prices and Catalogues furnished on Application.



PATENTED 1883.

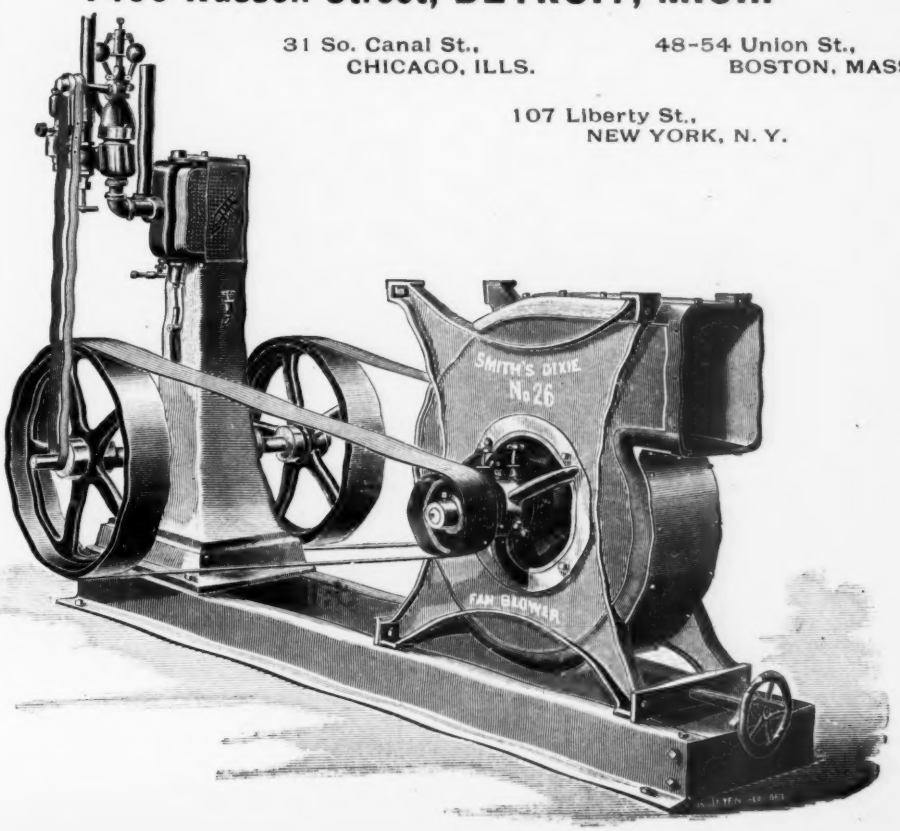
The Huyett & Smith Mf'g. Co.,

1400 Russell Street, DETROIT, MICH.

31 So. Canal St.,
CHICAGO, ILLS.

48-54 Union St.,
BOSTON, MASS.

107 Liberty St.,
NEW YORK, N. Y.

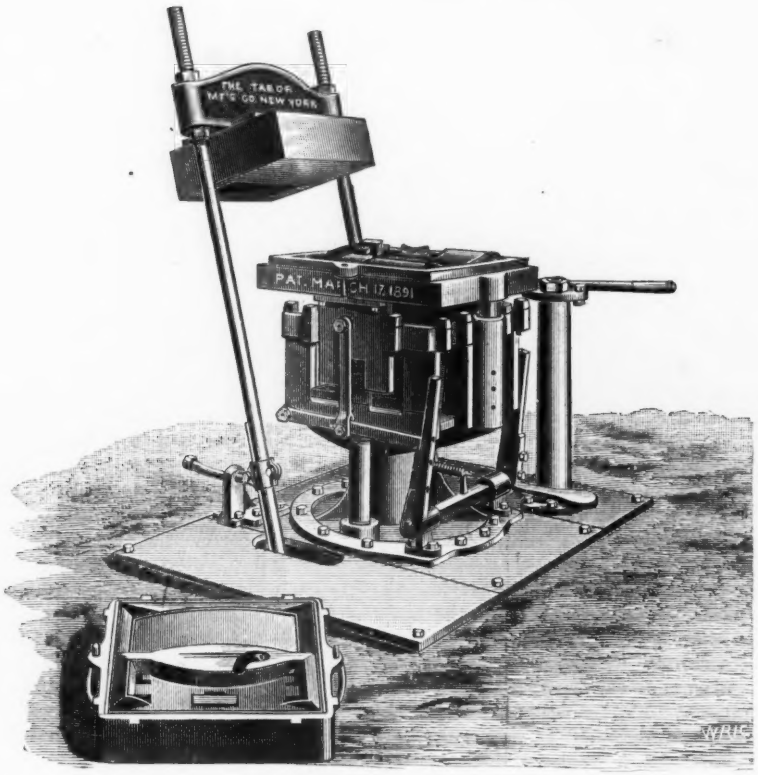


The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

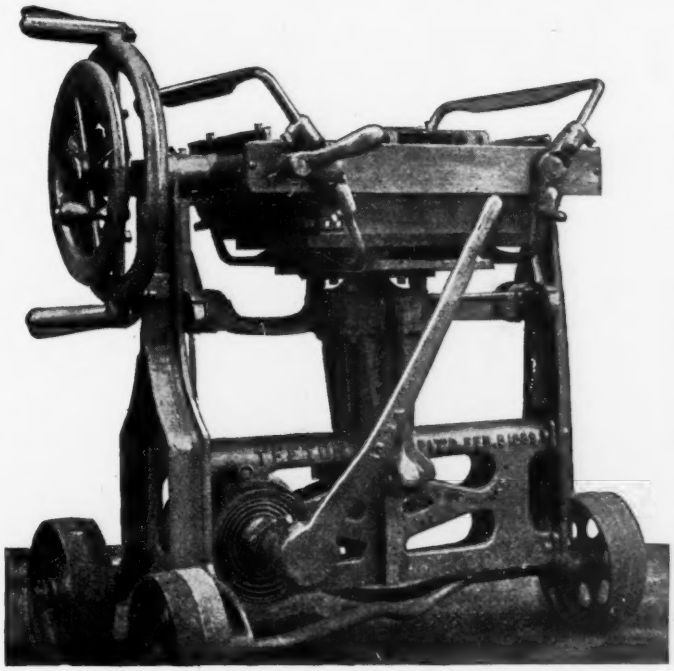
Everyone interested in Molding Machines should see one of ours in operation in Manning, Maxwell & Moore's Annex to Machinery Hall, World's Fair, Chicago.

111 and 113 Liberty Street,

NEW YORK, - - - N. Y.

Teetor Molding Machine.

Molding on the Right Principle Generally



Dispenses with the Greatest Factor of Expense

in Machine Molding; the "Stripping Plate."

Our reversed mode of molding makes it possible to operate almost all patterns on our Machine without use of stripping or draw plates.

—MADE BY—

Teetor Molding Machine Co

Write for our "Red Letter" List, Testimonials and Catalogue.

MENTION THE FOUNDRY.

INDIANAPOLIS, IND.

Wrought Iron Bridge Co.,

DESIGNERS AND BUILDERS IN

IRON AND STEEL

Fire Proof Buildings

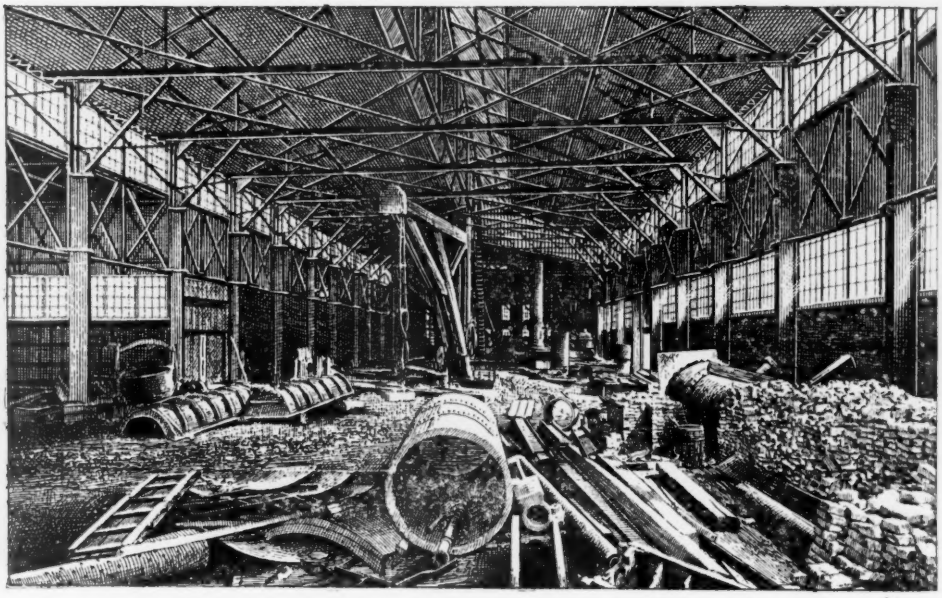
—FOR—

Foundries, Machine Shops,

ETC., ETC.

BUILDINGS DESIGNED FOR SPECIAL REQUIREMENTS.

Traveling and Jib Cranes for handling Heavy Castings and Machinery.



The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

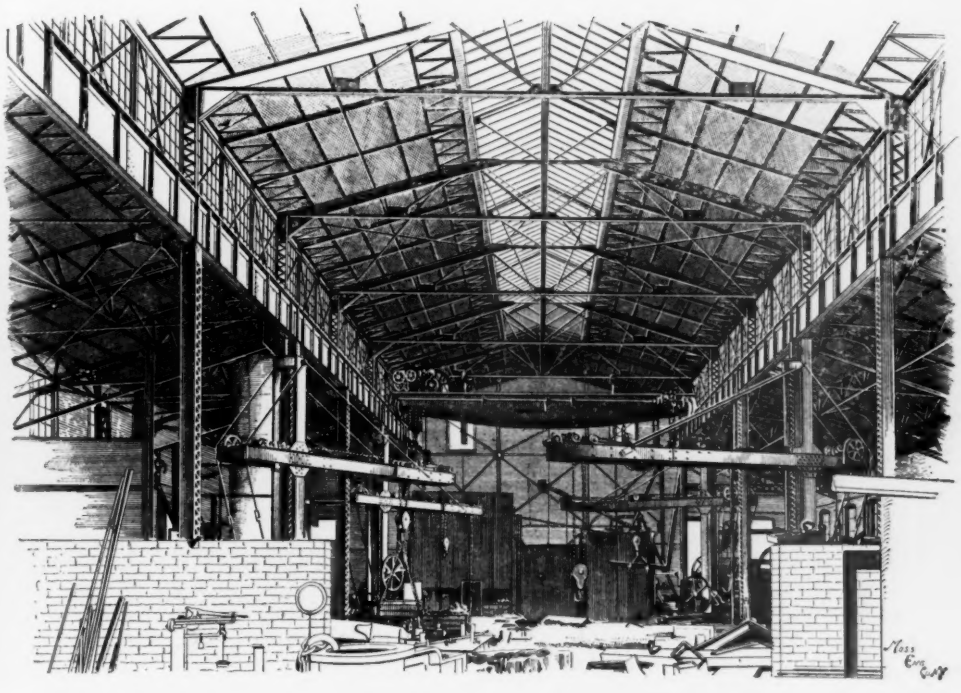
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

The Berlin Iron Bridge Co.

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph, and is an interior view in a foundry building, which was designed and built by us for Samuel F. Hodge & Company, Detroit, Mich. The building is 88 feet in width and 161 feet in length, the wings are 24 ft. in width and the central portion 40 feet in width, the latter controlled by a 20 ton Crane with a travel the full length of the building. The roof is covered with our Patent Anti-Condensation Corrugated Iron Roofing Covering, which we guarantee not to drip under all changes of temperature. We furnished this building entire, including the foundation, brick work—in fact the building complete, ready for the machinery.

Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

ESTABLISHED 1873.

THISTLE BRAND
Anti-Friction Metal.

In Use Everywhere and endorsed as being Unexcelled.

Read what W. & A. Fletcher Company, the leading Marine Engine Builders of New York say:

W. & A. FLETCHER COMPANY,
NORTH RIVER IRON WORKS
Mudson St., 12th to 14th Sts.

Hoboken, N. J. May 12th 1891

Mr David Wilson
Dear Sir
In answer
to Your enquiry for our opinion of Your
Anti-friction White Metal. We would state
that We have used it in a number
of Cases for the past two years and always
with entire Satisfaction — We consider
it excellent in quality and have no
hesitation in recommending its use
whenever Anti-friction metal is needed.
Yours Respectfully
W. & A. Fletcher Co.
A. F. Fletcher Sec.

—INVALUABLE FOR—

Steel Mills, Pressure Blowers, High Speed Engines, Dynamos, Saw Mills, Rolling Mills, Sugar Mills, Steamships, Flour Mills and all Machinery Bearings.

Brass Composition and Bronze Castings. Address

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510 and 512 West Thirty-Third Street, - NEW YORK.

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Over 7,000 Miles of Railroad Under One Management.

MANUFACTURERS contemplating the removal of their plants or the building of branch ones in the West are urgently requested to communicate with the undersigned.

OPPORTUNITIES, RESOURCES, ASSISTANCE.—THE BURLINGTON ROUTE reaches with its own line nearly every place of note in ILLINOIS, IOWA, MINNESOTA, MISSOURI, NEBRASKA, KANSAS, DAKOTA, WYOMING, COLORADO, and has direct connections to every point in America.

EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustible stone quarries of every description: immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

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There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States.

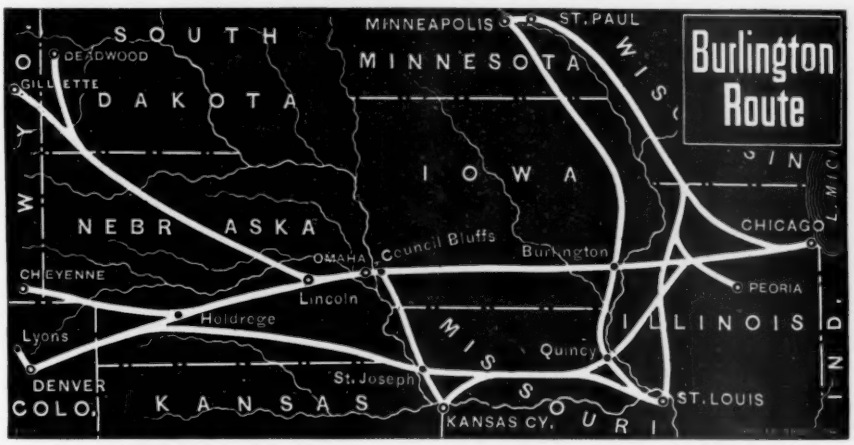
The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATER UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world Will appreciate any correspondence requesting information, etc.

This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

THE BEST RAILWAY.



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And all Points in Colorado, Utah and California.

P. S. EUSTIS, Gen'l Pass'r and Ticket Agent,
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A large, handsome Map of the United States, mounted and suitable for office or home use, is issued by the Burlington Route. Copies will be mailed to any address on receipt of twelve cents in postage by P. S. EUSTIS, Gen'l Pass. Agt., C., B. & Q. R. R., Chicago, Ill.

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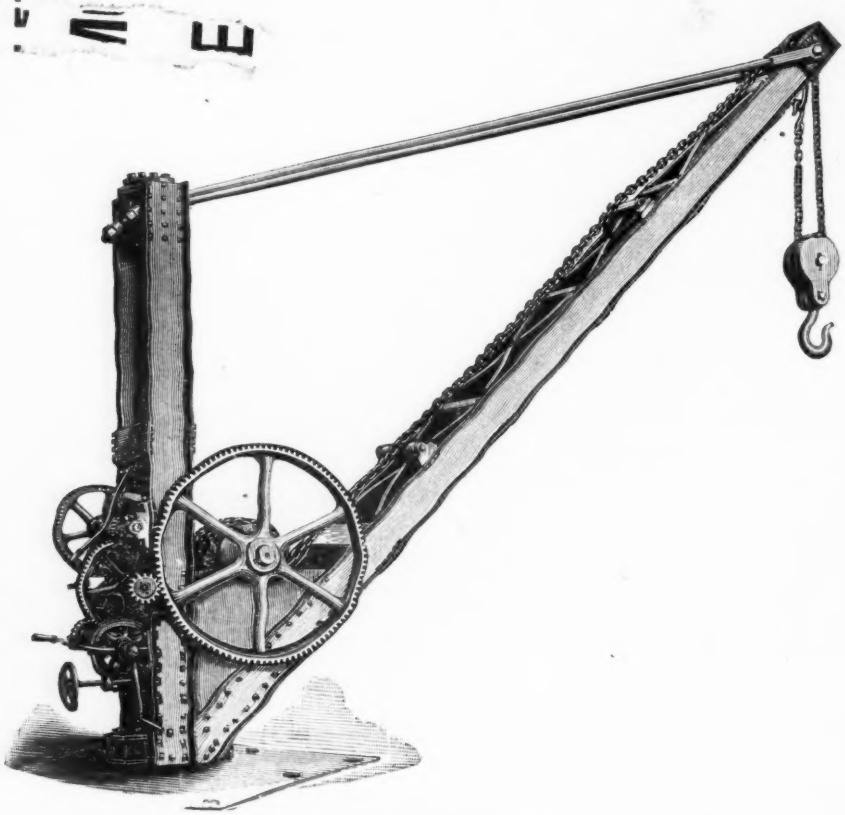
T. H. BROOKS, Pres. W. H. SHEPARD, Vice-Pres & Treas. L. C. SHIPHERD, Sec'y.
W. RUSSELL, Mgr.

The Phœnix Iron Works Co.

WASON STREET,

Between St. Clair and Superior Streets.

CLEVELAND, - - OHIO.



MANUFACTURERS OF

Hand, Steam, Hydraulic and Electric Cranes,

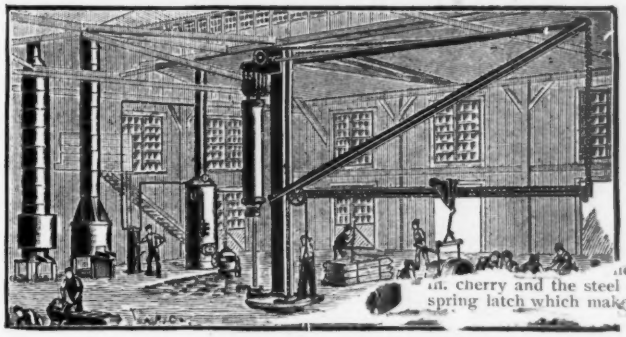
FOR ALL PURPOSES.

FOUNDRY LADLES, CHAINS & GENERAL MACHINERY.

Correspondence Solicited. Write for Catalogue.

COMPRESSED AIR HOISTS. STEAM HYDRAULIC STOCK ELEVATORS.

Ridgway Balanced Steam Hydraulic Crane.



Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

THE GREATEST FOUNDRY CRANE KNOWN.

You will never know how good it is until you fully investigate it. Every New or Remodeled Foundry is "Missing it Bad" if they do not adopt this Crane.

One of the Largest Concerns in Cincinnati, Ohio writes:

"We estimate an efficiency of full 50 per cent. more work with the same wages upon floors they cover than by any old style crane and a far greater adaptability to floor work than overhead travelers would accomplish."

The Foreman of the Largest Foundry in Chicago in a letter to the Editor of THE FOUNDRY says:

"It is the Best Crane for a Foundry I ever saw or heard tell of."

It will be money in the pockets of every Foundry to throw away their present winding cranes of whatever type, hand or power, and put in these

Quick Acting and Sure Cranes.

This Crane uses such a trifling amount of steam that it need not be taken into account, even on the most limited supply. The steam used is never missed. The most economical power user known.

Give steam, air or water pressure, height to square of building, radius and capacity and we will name satisfactory prices. *Send for circulars.*

CRAIG RIDGWAY & SON,

COATESVILLE, PENN.

THE WALKER MFG. Co

ENGINEERS, FOUNDERS and MACHINISTS,

CLEVELAND, OHIO, U. S. A.

FOUNDRIES
COMPLETELY EQUIPPED.

Cranes, Cupolas, Ladles, Sand Sifters, Core Oven Trucks, Rolling Mills, Hydraulic Elevators, Blowing Engines, Etc.

MACHINE MOLDED PULLEYS AND GEARS
A Specialty.

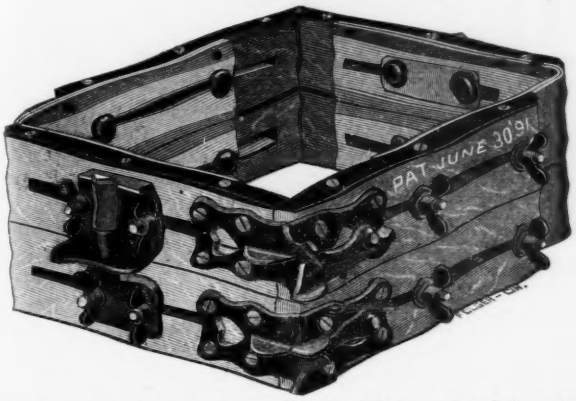
IN Accuracy of Pitch, Definition of Form, and Smoothness of Surface, Gears produced by our Patented Machinery are beyond compare. Moreover, extensive experience and scientific experiment, enables us to make our castings of a grade of iron perfectly adapted for strong, durable, Gears. During the last ten years thousands of our Gears have been sent to all parts of the United States, and have given universal satisfaction.

CORRESPONDENCE SOLICITED.

The Adjustable Snap Flask Co.,

LIBERTY, UNION CO. IND.

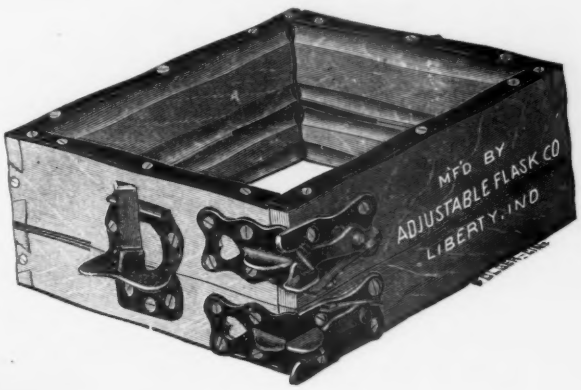
The Combination Adjustable Snap Flask.

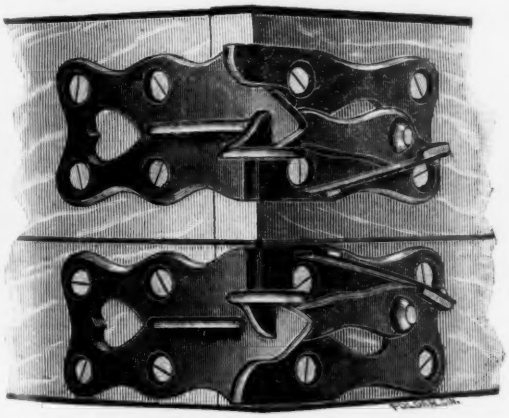


We present to you in the accompanying illustration, our new *Adjustable Combination wood and metal* snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, *to suit patterns used. The* wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. *The steel pieces are the inside lining* of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-S steel. It has a *spring latch which makes it very easy to open* and close. It is made so substantial that it will not shift or get out of order while in use. *In matching drag with cope, it* makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. *It will suit the molder because he* uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will *answer the same purpose as several different sizes of the old style.* The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many *new ones. A three part flask is* made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is especially adapted for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch, and is also fitted with adjustable eyes and malleable corner pieces, the latter features of which are not shown in accompanying cut.





AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

Write for Catalogue. Prices and Terms sent on Application.

FOR SALE BY ALL OF THE LEADING FOUNDRY SUPPLY DEALERS.

ESTABLISHED 1879.

THE OHIO SAND CO.,

CONNEAUT, O.

Miners and Shippers of
all Grades of

MOLDING SAND,

—Which is—

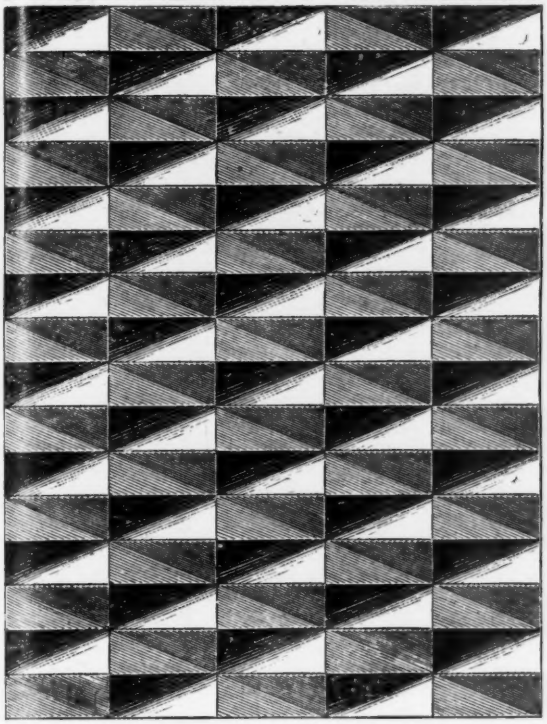
SECOND TO NONE.

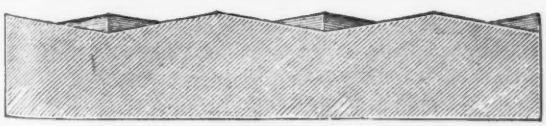
Samples prepaid and prices quoted on application.

Banks at Conneaut and Kingsville in the WESTERN RESERVE.

This Sand has been on the market for over thirty years and gives such satisfaction that our trade increases yearly in excess of our expectations.

We can refer you to the largest and best producers of Stove Plate, Light Bench Work, Radiator Work, Malleable Work and all grades of Machinery Castings, who have used our Sand for years.





THE ABOVE CUTS SHOW EXACT SIZE OF DIAMONDS.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLACES, Etc.

This Patent Lumber is made by a Special Machine invented by us, (the ONLY Machine of its kind), and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

SIZE of each piece, 8 feet long by 6 inches wide, and ½ inch thick. PRICE, 10 cents per RUNNING foot of 6 inches in width, NET CASH, crated and delivered f. o. b. Chicago, in orders of not less than 6 pieces. SEND FOR SAMPLE.

BROWN BROS. MFG. CO.

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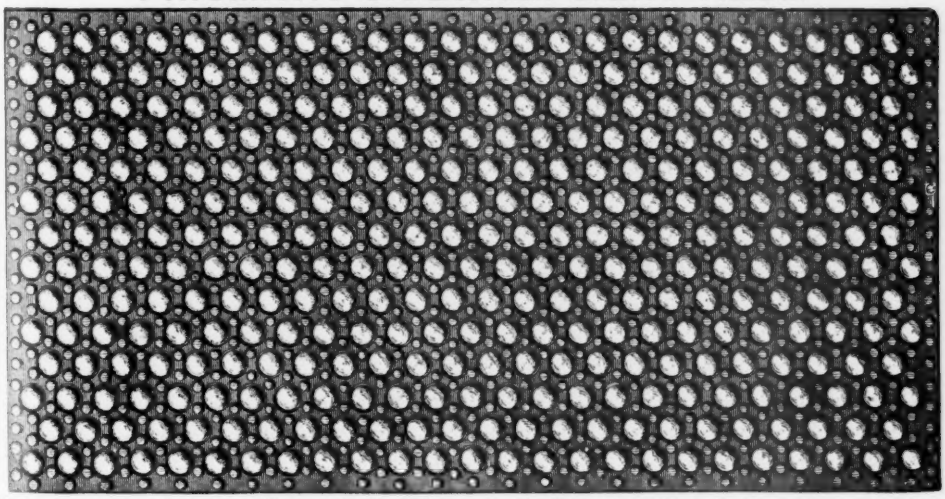
PRISMATIC SIDEWALK LIGHT TILES.



Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights.

Write for prices.

Mention THE FOUNDRY.

BROWN BROS. MFG. CO.

Cor. Jackson & Clinton Sts., CHICAGO.

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A VALUABLE REFERENCE BOOK

—OF—

350 PAGES

With Fine Morocco Cover.

WE have secured a large number of copies of a most valuable work, entitled, "The Handy Mechanical Pocket Companion," which we propose to **GIVE AWAY** to those who are already subscribers to THE FOUNDRY. on condition that they send us one new subscriber.

This book is the very best thing of its kind we know of, and contains more valuable information for mechanics than we have ever seen under one cover before. The price is $1.00 for book alone but sent free to any one sending us one new subscription. It is a perfect encyclopedia of the most valuable information and while treating mechanical subjects on a broad basis contains much of especial interest to foundrymen.

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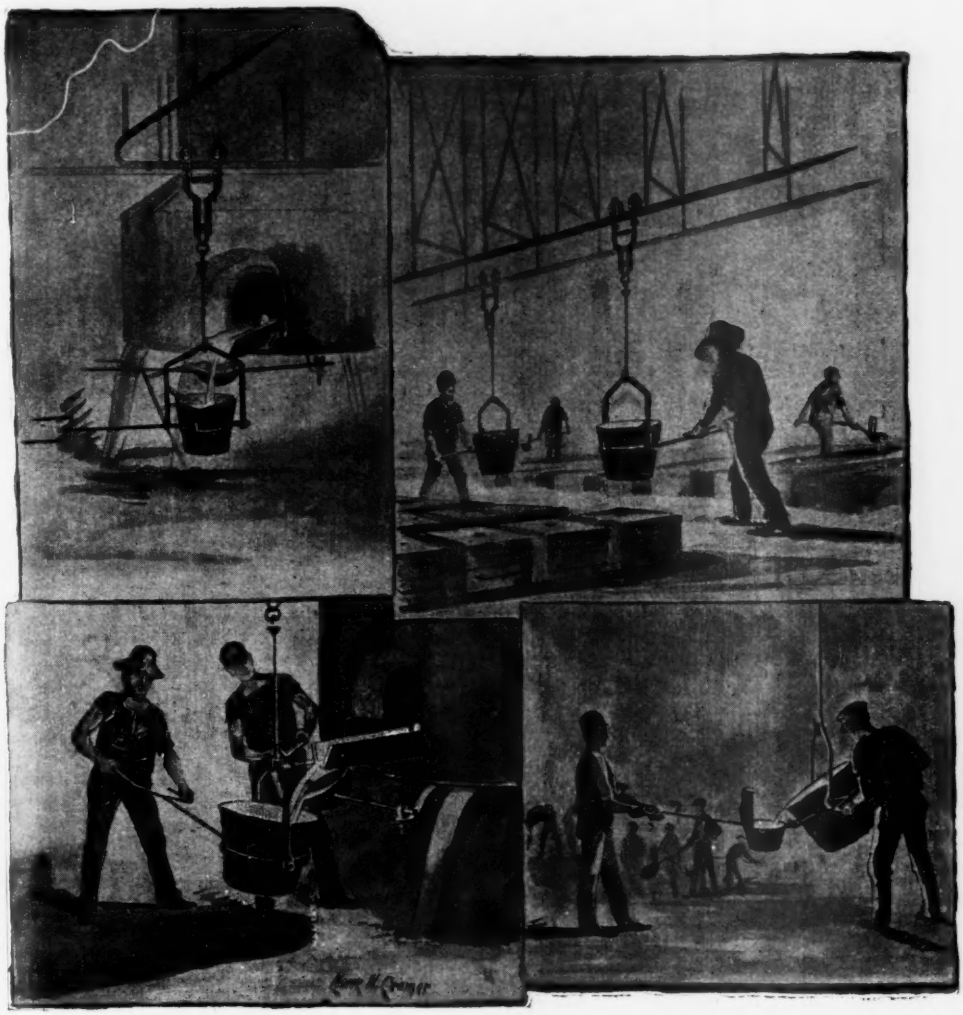
☞ Any one sending a club of five new subscribers (5 at one time) and $7.50 will be entitled to one subscription free.

Hayes' Patent Iron Carrier.



The most complete Labor Saving device for facilitating the rapid handling of large quantities iron ever placed on the market.

Just the thing for Stove, Architectural, Car and in fact all kinds of foundries where it is necessary to have "rapid transit" of iron from cupola to mold. Will save its cost in six months in labor to say nothing of better castings, convenience and economy in material. For full information, cost, etc. Address,

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The Grenier Economical Cupola.

OVER 500 IN USE.

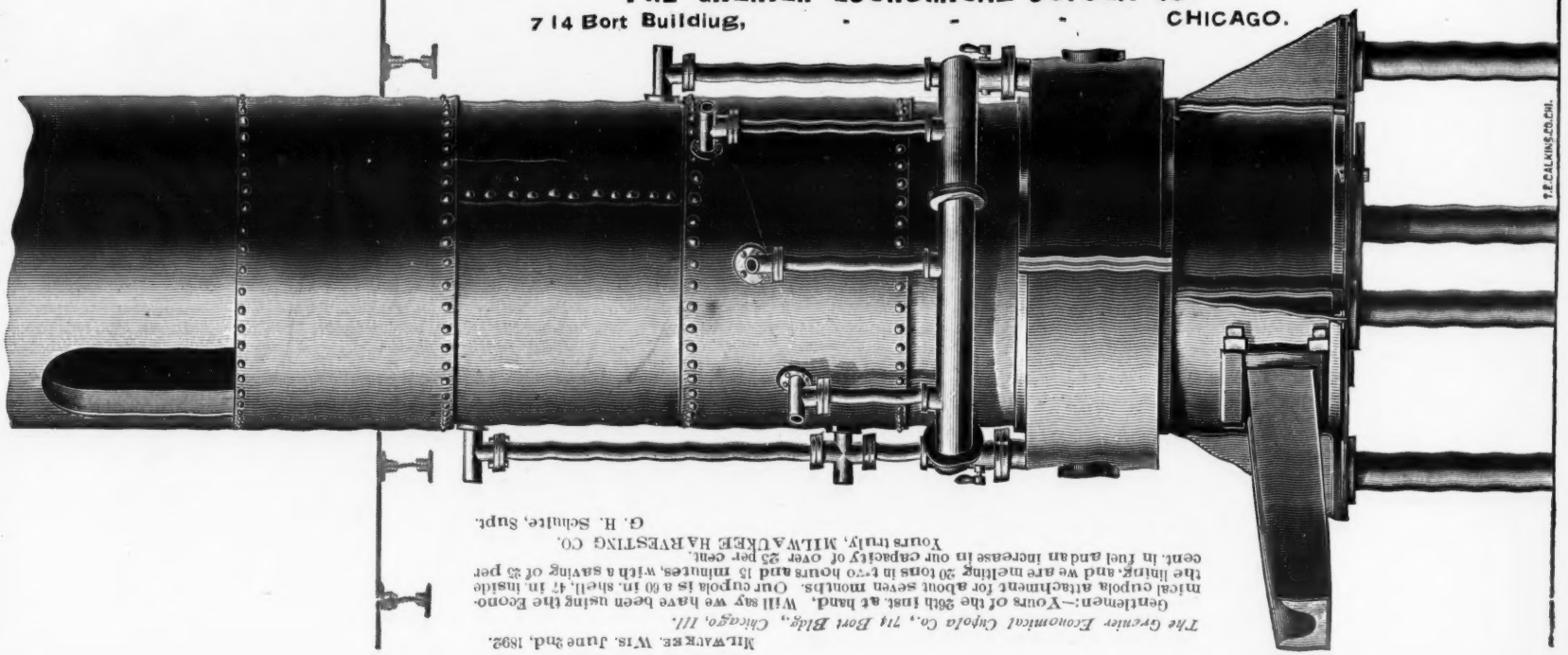
CUPOLAS BUILT OR

"SYSTEM APPLIED TO ANY CUPOLA."

15 per cent. Saving in Fuel Guaranteed. Write,

THE GRENIER ECONOMICAL CUPOLA CO.

714 Bort Building, - - - CHICAGO.



T.E.CALKINS,CO.CHI.

MILWAUKEE, WIS. June 2nd, 1892.

The Grenier Economical Cupola Co., 714 Bort Bldg., Chicago, Ill.

Gentlemen:—Yours of the 26th inst. at hand. Will say we have been using the Economical cupola attachment for about seven months. Our cupola is a 60 in. shell, 47 in. inside the lining, and we are melting 30 tons in two hours and 15 minutes, with a saving of 25 per cent. in fuel and an increase in our capacity of over 25 per cent.

Yours truly, MILWAUKEE HARVESTING CO.

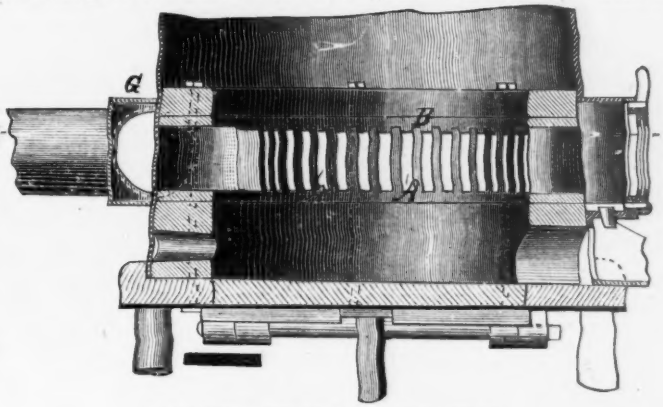
G. H. Schulte, Supt.

The Blakeney Cupola Furnace

IS GUARANTEED

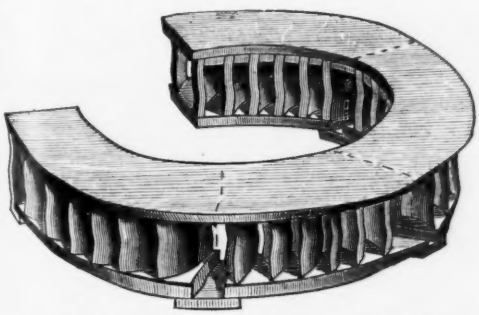
To be more *Economilal;* To *Melt Faster;* To produce Iron of a more *Uniform Grade* and *Strength;* To be entirely Free *from Clogging;* To have the most *Perfect Combustion:* To be *Lower in Prtce* than any Cupola on the Market. If you wish to improve your Melting Facilities, it will pay you to investigate our Illustrated Catalogue and Price List. Sent Free.

Kankakee, Ill., Jan. 30, '93.
The Springfield Cupola Co., Springfield, O.
Gentlemen:—I desire to say that the No. 1 Cupola purchased of you some time ago has proved to be all you claimed for it. It is a wonderful melter with little fuel. We have melted 7,000 lbs. of iron in forty minutes with 600 lbs of coke, a result of over 11½ to one. Yours truly,
M. A. WORTH, Supt. Laing Machine Co.

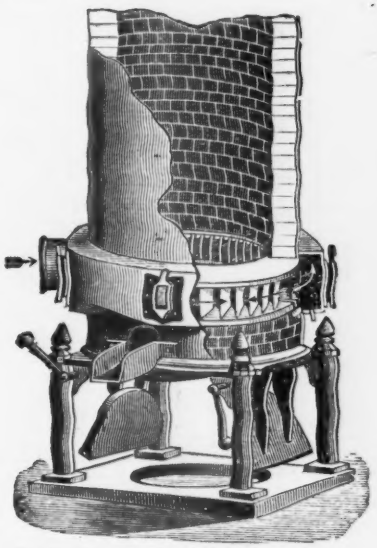


Sectional Elevation of the Lower Portion.

Has Been Adopted by the U. S. Navy Department.



The Combination of Sections of Tuyeres as placed in wall.



Sectional View of Blakeney Cupola Furnace.

The Springfield Cupola Co.

SPRINGFIELD, - - - OHIO.

THE S. OBERMAYER CO., Cincinnati, O., General Selling Agents.
THE FOUNDRY SUPPLY CO., Boston, Mass., *New England Selling Agents.*

Detroit Foundry Equipment Co.,

Office and Works, Michigan Ave. & D. & B. C. R. R.

DETROIT, MICH.

CHICAGO OFFICE,
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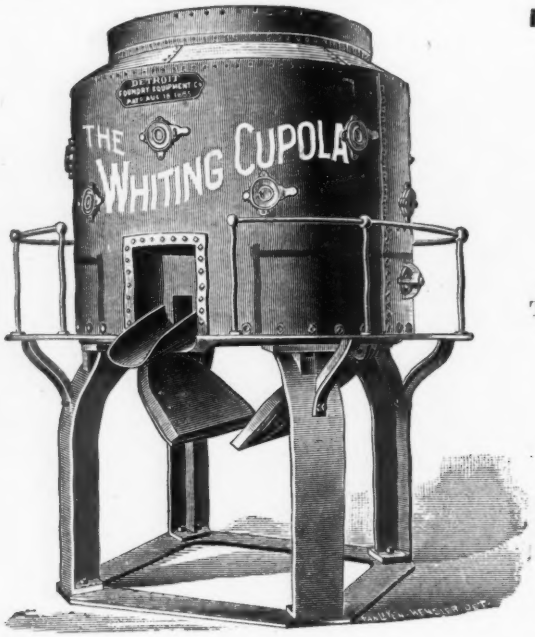

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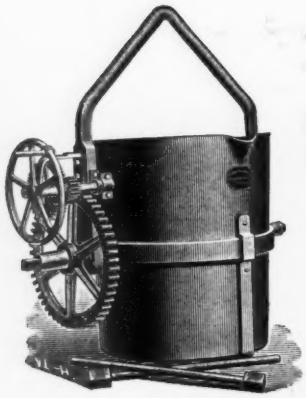

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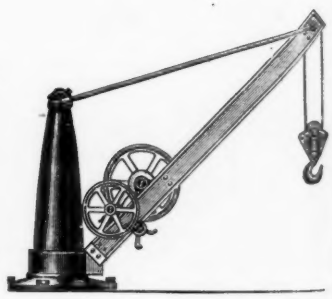

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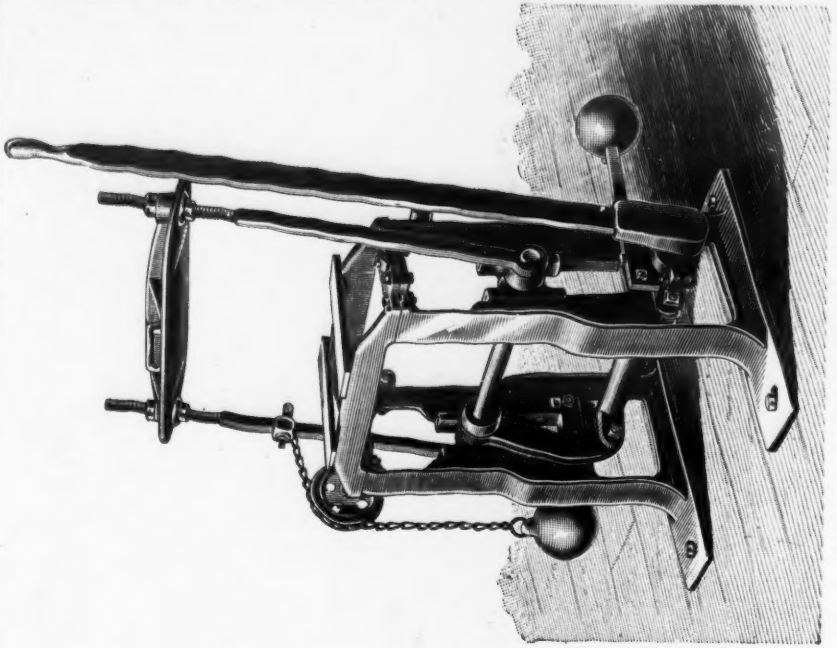

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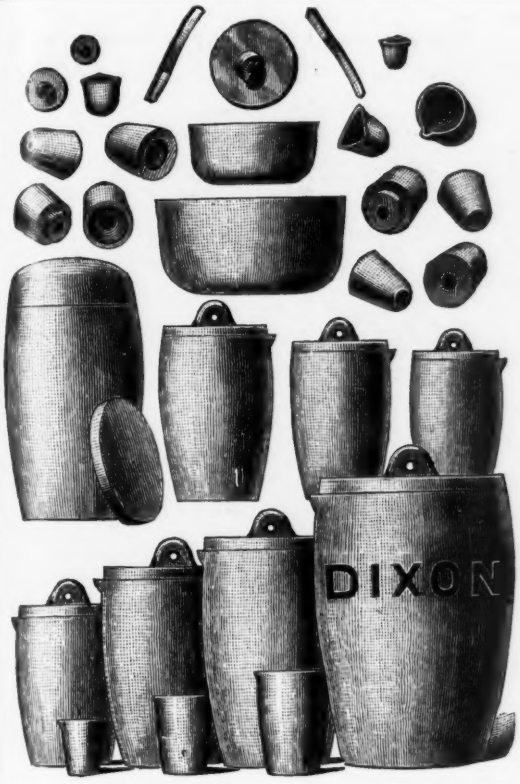

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IN a few of the manufacturing interests of the country the industry cannot be mentioned without suggesting one particular firm. This is true, for example, in oil refining; one company is thought of at once, and it is equally true regarding the making of patterns for castings. The Gobeille Pattern Company are the largest manufacturers in this line in the world. Their special tools and system for division of labor has been pronounced by experts as enexcelled in the history of wood working. Every reader will recall their unique trade-mark, which is an owl with the words, "Be Wise."

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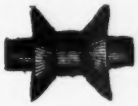

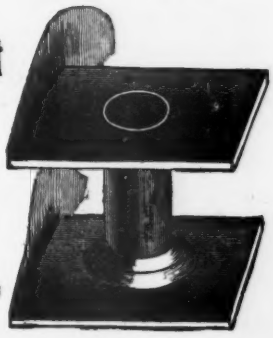

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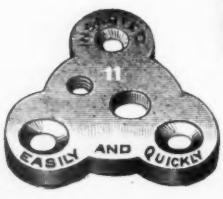

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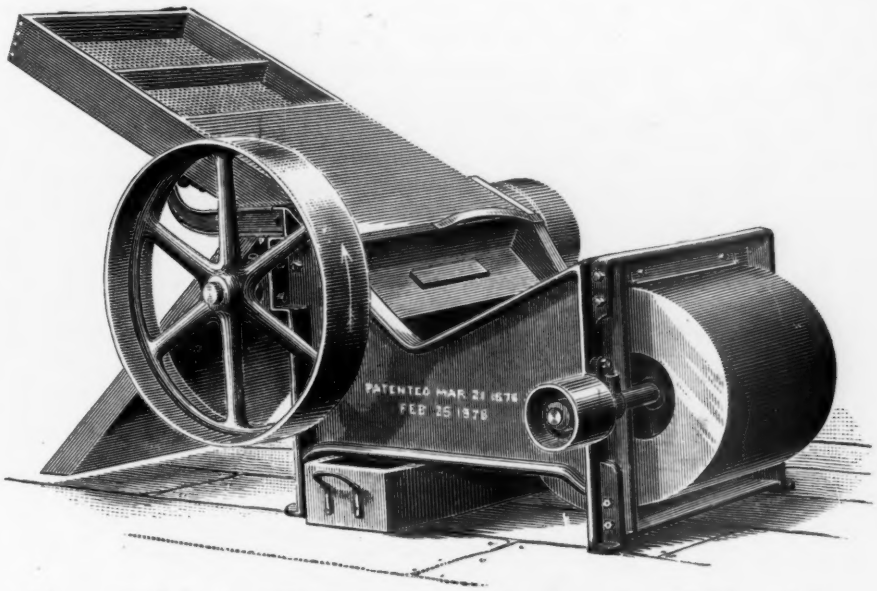

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Saves all shot and scale iron from foundry refuse. Used, appreciated and commended by Leading Founders in all parts of the country.

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Or do you know that possibly the reason you do not make as good castings as your neighbor, is because you do not examine into the merits of the goods offered for sale by reliable concerns who may be soliciting your trade. This is an age of progress and if you want

THE BEST MOULDING SAND

Either for LIGHT or HEAVY WORK, we can supply you. We also handle the very best RIDDLES, BRUSHES, CUPOLA BLOCKS, FIRE BRICK, FIRE CLAY, etc. Do not overlook the fact that we are the largest dealers in moulding sand in the west, and can no doubt give you your choice of a greater number of kinds of sand at lower prices than you can purchase elsewhere. Will be glad to hear from you and quote you anything you may need.

Yours very truly,

The Garden City Sand Co.,

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Foundry Facings, Blackings and Supplies,

GEORGIA SOAPSTONE.

We have secured in the State of Georgia a Soapstone Mint which contains a material superior to anything now being offered. It will give better satisfaction than Talc or any so called Soapstone, as it is of a greacier nature. We shall be pleased to send sample and prices to those requiring a first-class article.

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IN PROOF OF THIS see the beautiful Stoves and other fine castings of all sizes, weights and descriptions *now on Exhibition* at the

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THREE-FOURTHS of which were made with the *assistance of our Facings*, Blackings, Plumbago and "Peerless" Perfect Wash. "Their name is Legion," a whole *page of this Journal* would not contain their addresses, and invidious distinctions are distasteful.

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Nice, Bright, Smooth Castings?

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Obermayers' Prepared Plumbago

To be used wet or dry, either on Loam or Green Sand moulds, for Heavy or Medium weight Castings. To be applied with a camel's hair brush or with the hand.

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To Give Satisfaction

Will send Trial Barrel to any reputable foundry in the United States to be paid for if satisfactory, if not, to be returned at our expense.

Price, 3 1-2 Cents per Pound.

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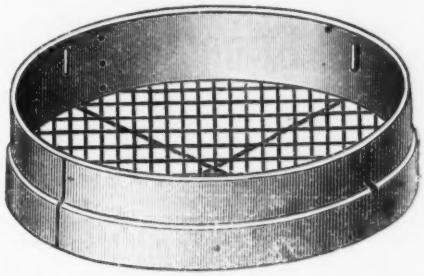
Two New Articles For the Foundry.

SILEX—To patch up the burned out portion of the Cupola and Ladles, mix with water to consistency of Mortar apply with hand or trowel, for economy's sake, add ¼ of Molding Sand, and it will stick fast and hard and will last long. In car loads, $4.00 net per ton.

TRUE DOLOMITE—Use in Cupola, 1 or 2 shovels to each charge of iron. It is the cheapest Flux in the market. It attacks the sulphur and cleanses the iron, gives a clean drop. It is better than oyster shells and about as good as Fluor Spar. Price in car loads ready to use, $4.00 per net ton.



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C. F. M. Founders' Perfect Wash

A Wonder to our Customers,
Puzzle to Our Competitors,
Wash We are Proud of,
Wash YOU would not be without
if you KNEW ITS VALUE.

ROBERT SMACK & CO., Iron Founders.

New York, Feb. 11th, 1893.

Cleveland Facing Mills, Cleveland, O.

Gentlemen:—Please ship us on as soon as possible, 1,000 lbs. of C. F. M. Founders' Perfect Wash, same as sample you sent us for trial. We finds it works better than anything we have ever used.

Yours truly,
Robert Smack & Co.

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Cleveland Facing Mills, Cleveland, O.

Dear Sirs:—Please ship us on as quickly as possible 1,000 lbs. C. F. M. Founders' Perfect Wash. Your Wash can't be beat.

Very truly yours,
Robert Smack & Co.
Pr. Sam'l J. Smack.

THE BLACK & CLAWSON CO.

Hamilton, O., March 29th, 1893.

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Gentlemen:—A short time ago you sent us a sample order, one bbl. core wash, which pleased us, and we now wish you to send us 10 more bbls. of the same article.

Yours truly,
The Black & Clawson Co.

BELL & FYFE FOUNDRY CO.

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Please ship and note on invoice our Order Number, the following, 2 bbls. "C. F. M. Founders' Wash." Same as sent on bill Dec. 12th, 1892.

Bell & Fyfe Foundry Co.

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Yours truly,
H. P. Young, Purchasing Agent.

Use our Wash, you will then have little use for Casting Brushes or Scrapers.

Especially adapted for Loam, Dry Sand and Skin Dried Castings. For Cores of any description. For Green Sand Work, when it can be rubbed in with the hand, or applied with a camel's hair brush.

No experiment, the fact is established that C. F. M. Wash is far superior to any other Foundry foremen from all parts of the country speak warmly of its merits.

We manufacture all kinds. Foundry Facings, Blackings, India Silver Leads, North Carolina Talc. Special facilities for grinding Seacoal Facing. Write—Your wants will have immediate attention.

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Miners and Shippers of
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—Which is—

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Samples prepaid and prices quoted on application.

Banks at Conneaut and Kingsville in the WESTERN RESERVE.

This Sand has been on the market for over thirty years and gives such satisfaction that our trade increases yearly in excess of our expectations.

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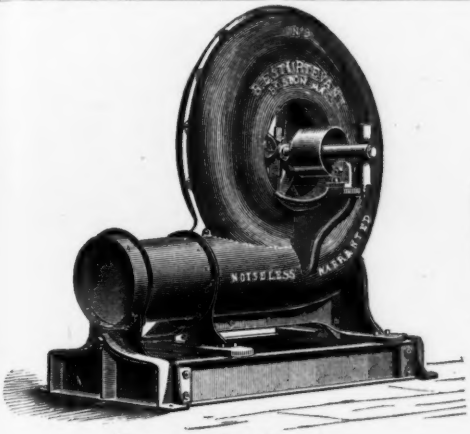

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THE STURTEVANT STEEL Pressure Blowers,

—FOR—

Cupola Furnaces and Forge Fires.

BLOWERS

Furnished without Bed with Separate Countershaft

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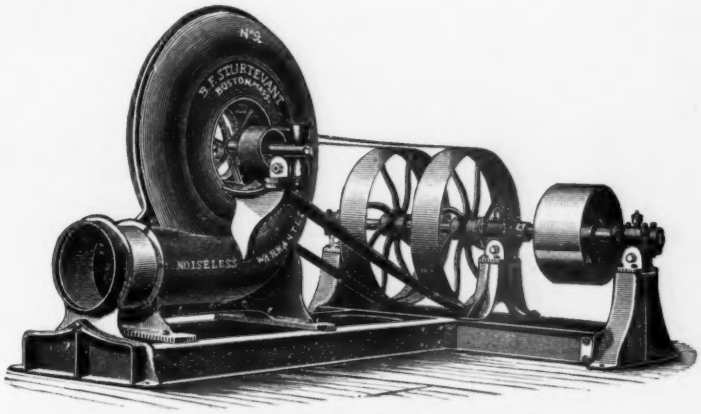
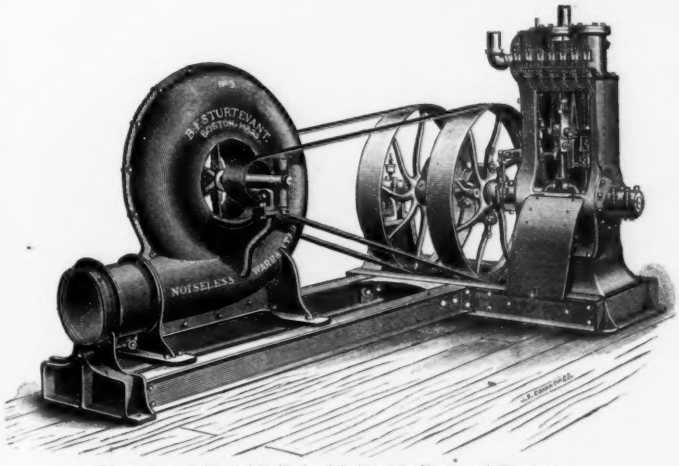


Blower on Adjustable Bed with Combined Countershaft.



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Direct Connected

Electric Motors.

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Made for use in any position, and will produce any desired pressure.

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All Sizes Kept in Stock.

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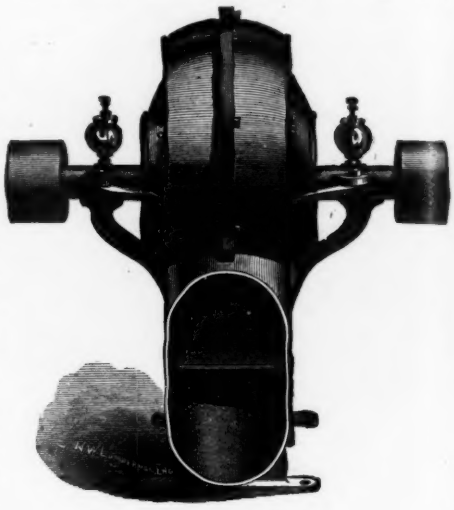

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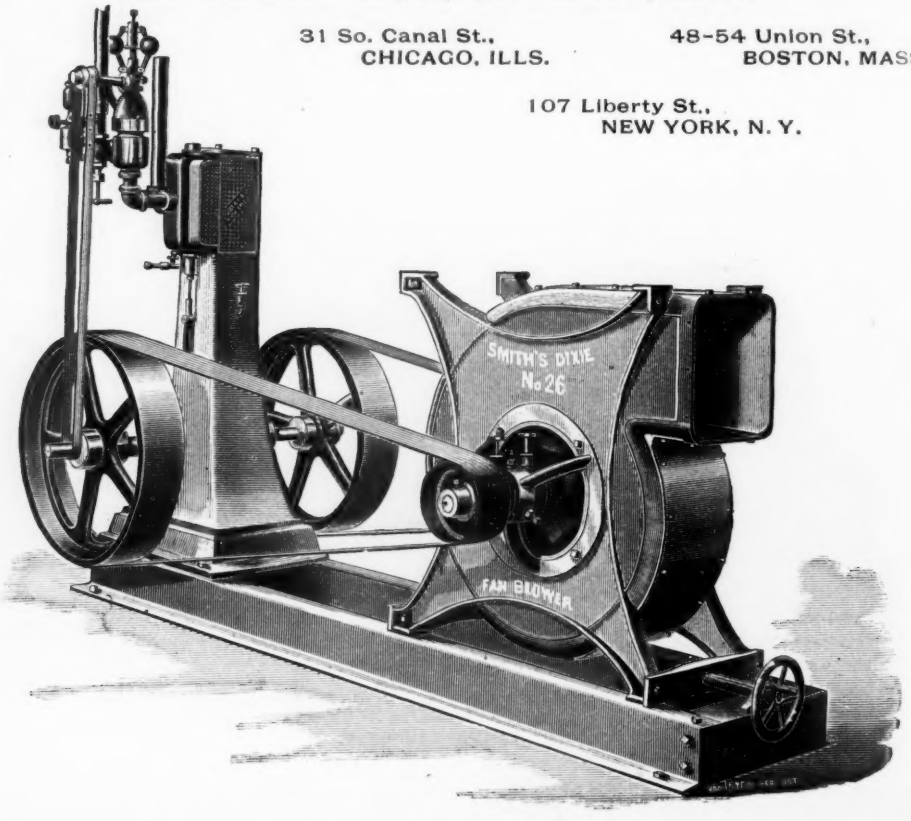

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A Better Designed,
A Better Constructed,
A Smoother Running,
A More Economical,
A More Efficient

ROTARY
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THAN ANY OTHER NOW ON THE MARKET.

On the above basis your patronage is respectfully solicited by

The Connersville Blower Co.,

CONNERSVILLE, IND.

Builders of a full line of

Improved Rotary Positive Pressure Blowers,

Especially adapted for all purposes requiring a FORCED BLAST.

The great improvement in these machines consists in the fact that the revolvers or impellers (two only, each cast in one piece) are accurately planned on cycloidal lines, thereby insuring perfect and continuous contact, increasing the efficiency, reducing wastage to the minimum, permitting of higher speed and in a great measure obviating that pounding and noise usually associated with machines of this class.

Besides the impellers there are a number of other VALUABLE IMPROVEMENTS.

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MILLETT'S PATENT CORE OVEN.

—With—

Double Doors, one at the back of shelf closing the oven when wide open.

Patented July 19, 1887.

Saves Fuel
Saves Expense
Saves Time
Does more work
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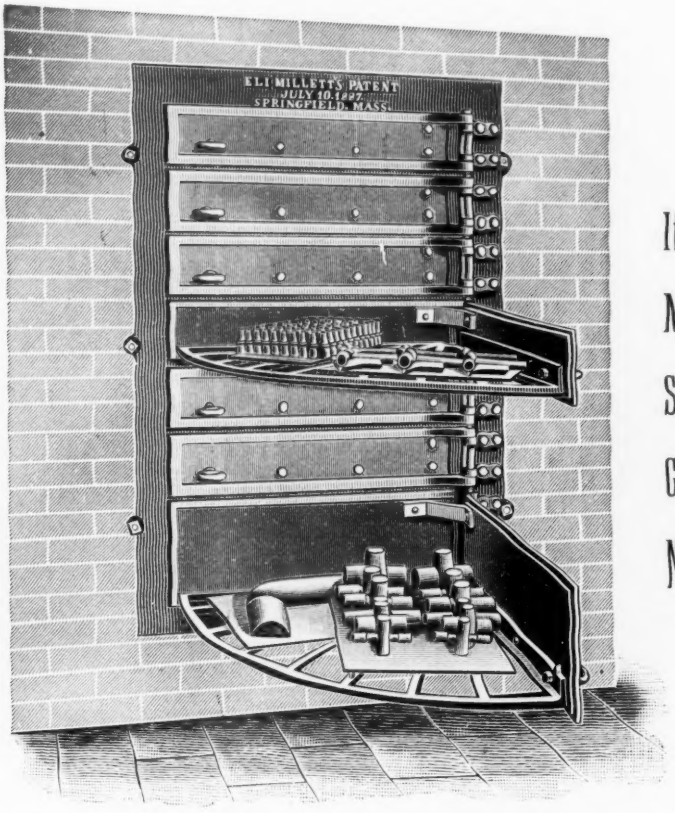
CORES.



If you Make Small Cores you Need it.

One Hundred in use and every one gives satisfaction.

Write us for circulars and prices.

Millett Core Oven Co.,

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FOR SALE BY PAXON & CO., PHILADELPHIA, PA.

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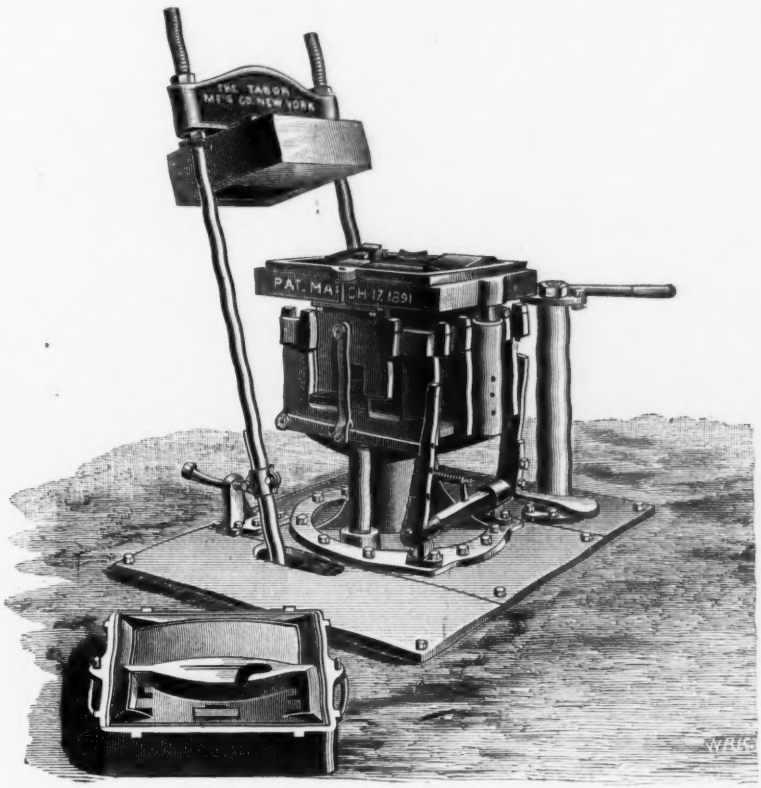
—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

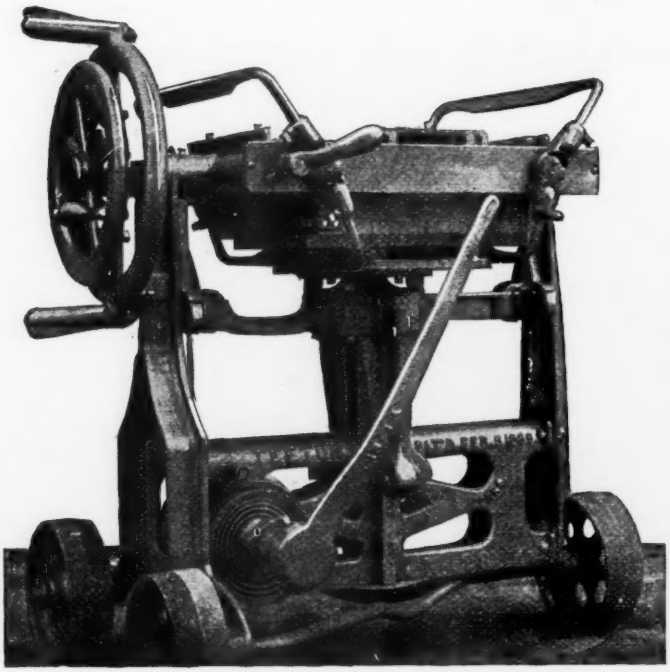
Everyone interested in Molding Machines should see one of ours in operation in Manning, Maxwell & Moore's Annex to Machinery Hall, World's Fair, Chicago.

111 and 113 Liberty Street,

NEW YORK, - - - N. Y.

Teetor Molding Machine.

Molding on the Right Principle Generally



Dispenses with the Greatest Factor of Expense

in Machine Molding; the "Stripping Plate."

Our reversed mode of molding makes it possible to operate almost all patterns on our Machine without use of stripping or draw plates.

—MADE BY—

Teetor Molding Machine Co.

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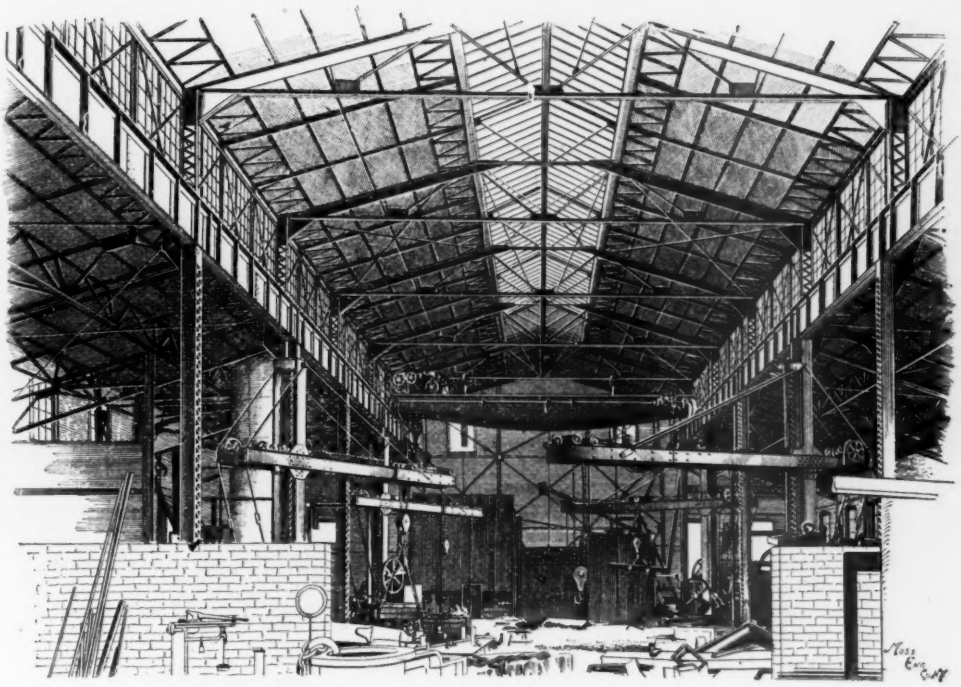
—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph, and is an interior view in a foundry building, which was designed and built by us for Samuel F. Hodge & Company, Detroit, Mich. The building is 88 feet in width and 161 feet in length, the wings are 24 ft. in width and the central portion 40 feet in width, the latter controlled by a 20 ton Crane with a travel the full length of the building. The roof is covered with our Patent Anti-Condensation Corrugated Iron Roofing Covering, which we guarantee not to drip under all changes of temperature. We furnished this building entire, including the foundation, brick work—in fact the building complete, ready for the machinery.

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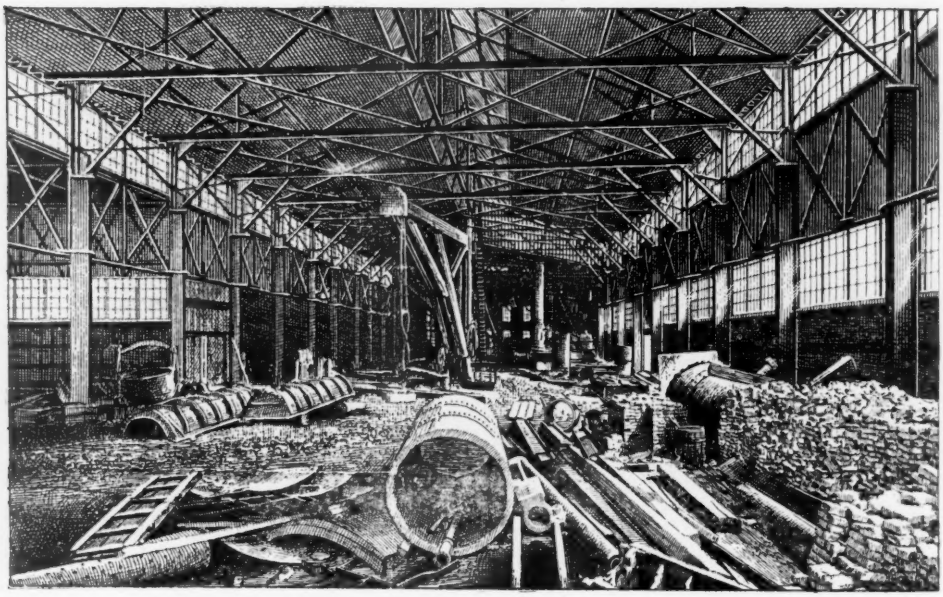

The above cut illustrates foundry Building built by us for Totten & Hogg Iron and Steel Foundry Co. at Pittsburg, Pa. The building is 65x176 feet, with an annex 48 feet square for boiler house. The roof and sides are covered with corrugated iron and fire-proof throughout.

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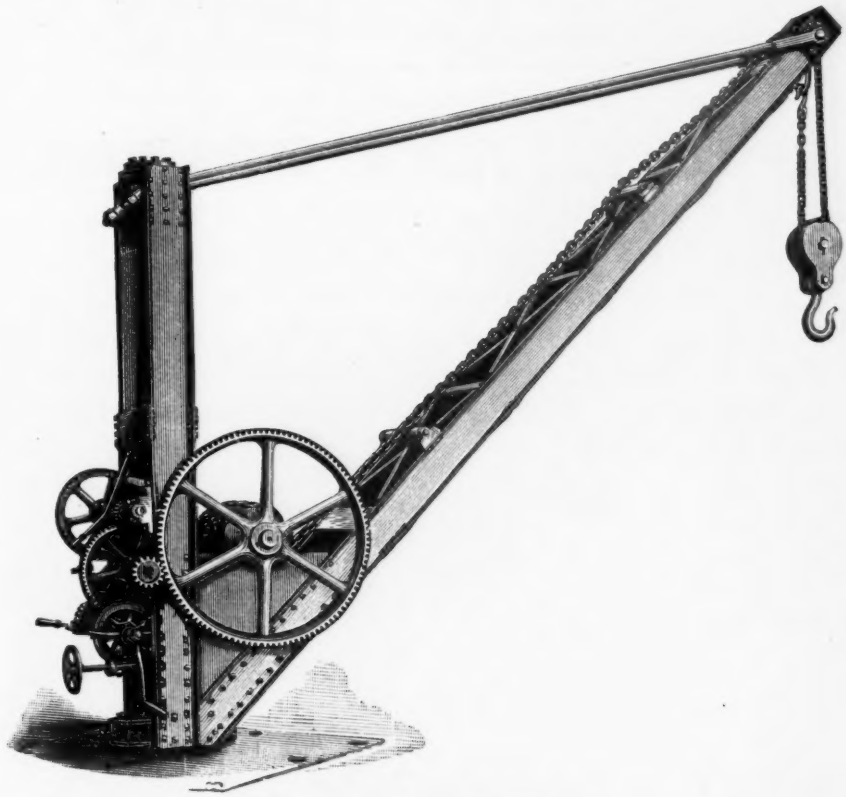

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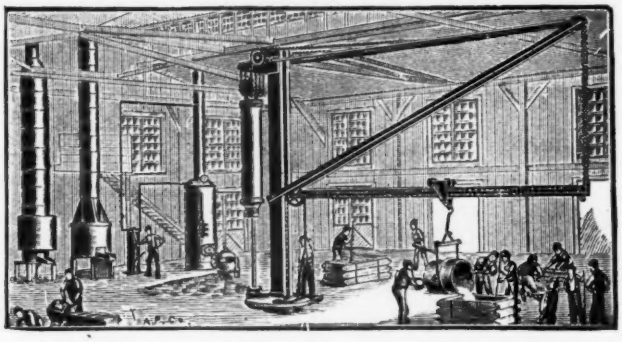

Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

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"It is the Best Crane for a Foundry I ever saw or heard tell of."

It will be money in the pockets of every Foundry to throw away their present winding cranes of whatever type, hand or power, and put in these

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This Crane uses such a trifling amount of steam that it need not be taken into account, even on the most limited supply. The steam used is never missed. The most economical power user known.

Give steam, air or water pressure, height to square of building, radius and capacity and we will name satisfactory prices. Send for circulars.

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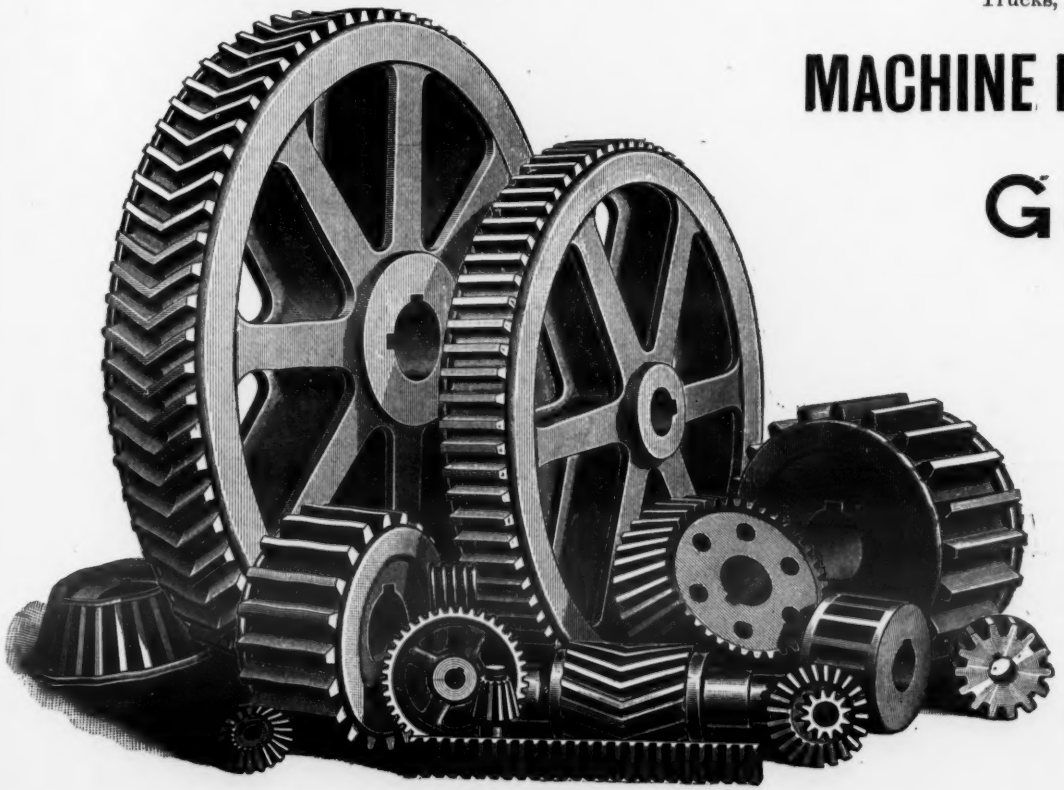

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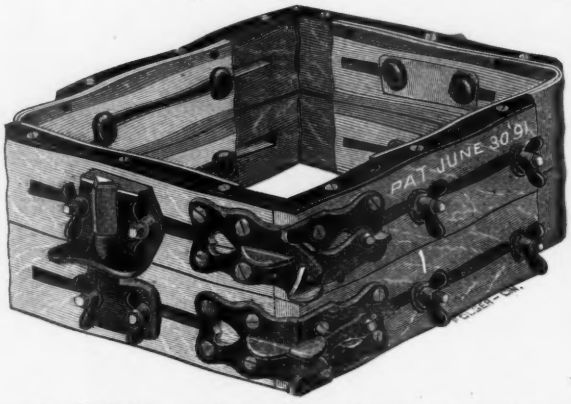
LIBERTY, UNION CO. IND.

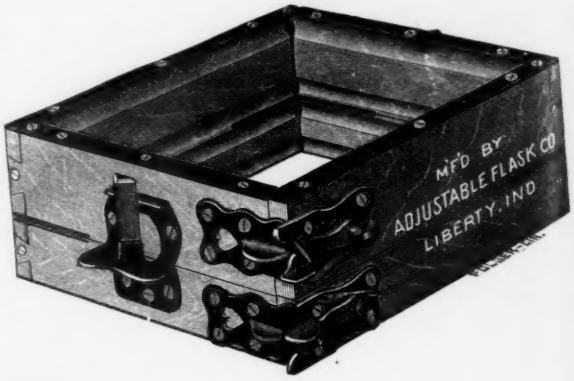
The Combination Adjustable Snap Flask.

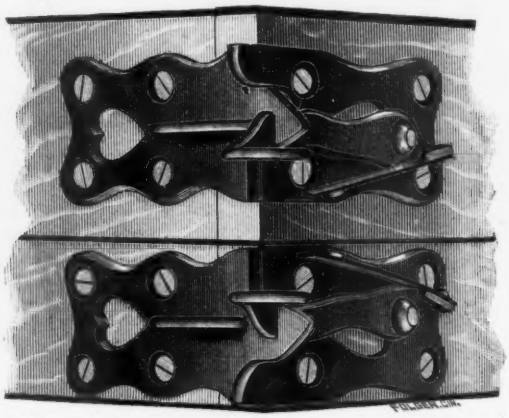


We present to you in the accompanying illustration, our new *Adjustable Combination* wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or *any size between, to suit patterns used.* The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-8 steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is especially adapted for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch, and is also fitted with adjustable eyes and malleable corner pieces, the latter features of which are not shown in accompanying cut.





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Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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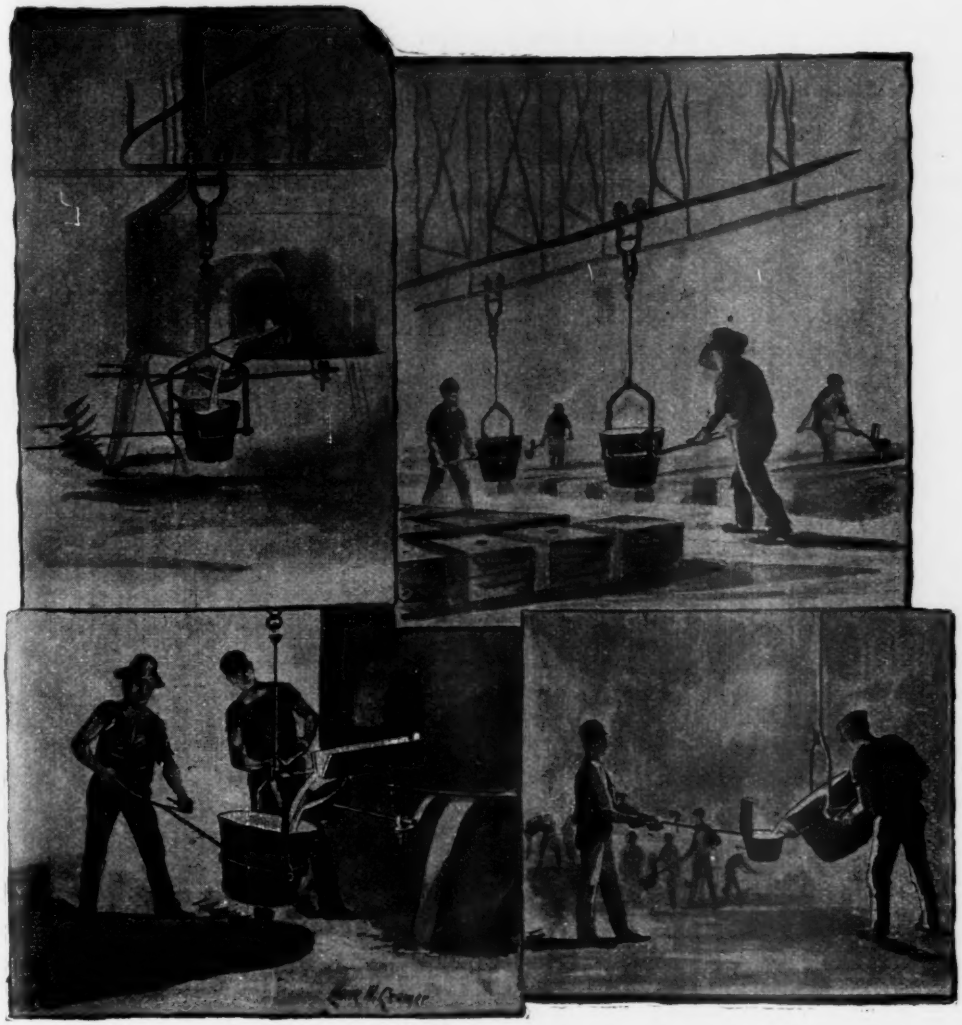

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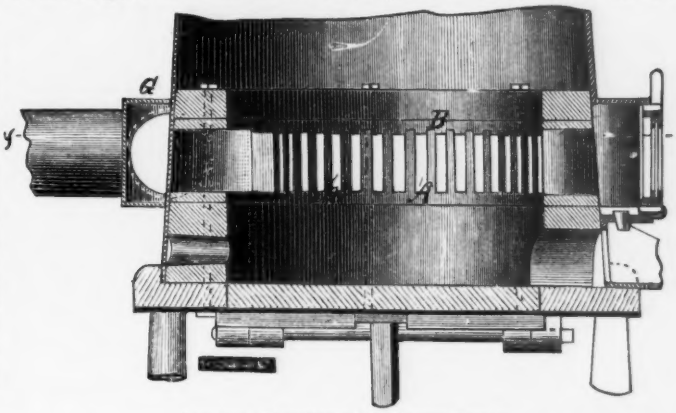

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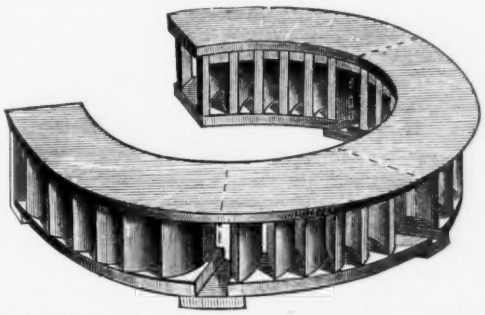
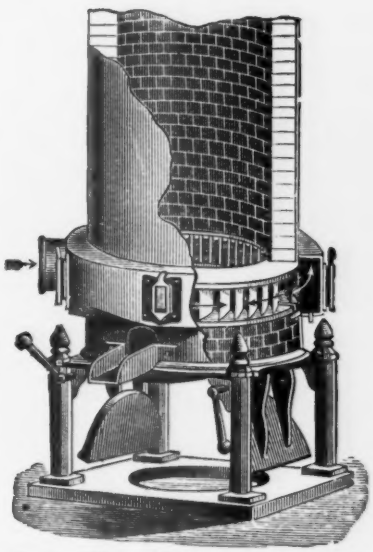


The Combination of Sections of Tuyeres as placed in wall.



Sectional View of Blakeney Cupola Furnace.

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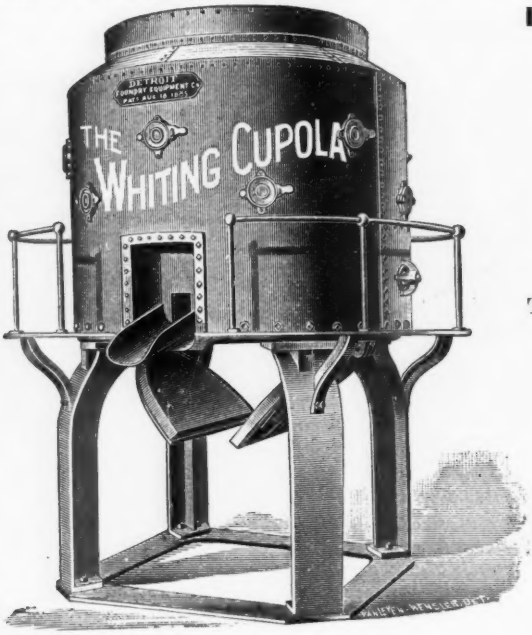

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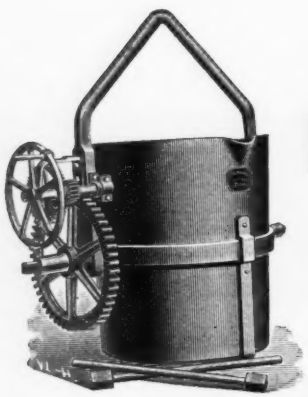

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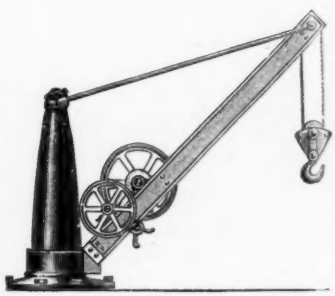

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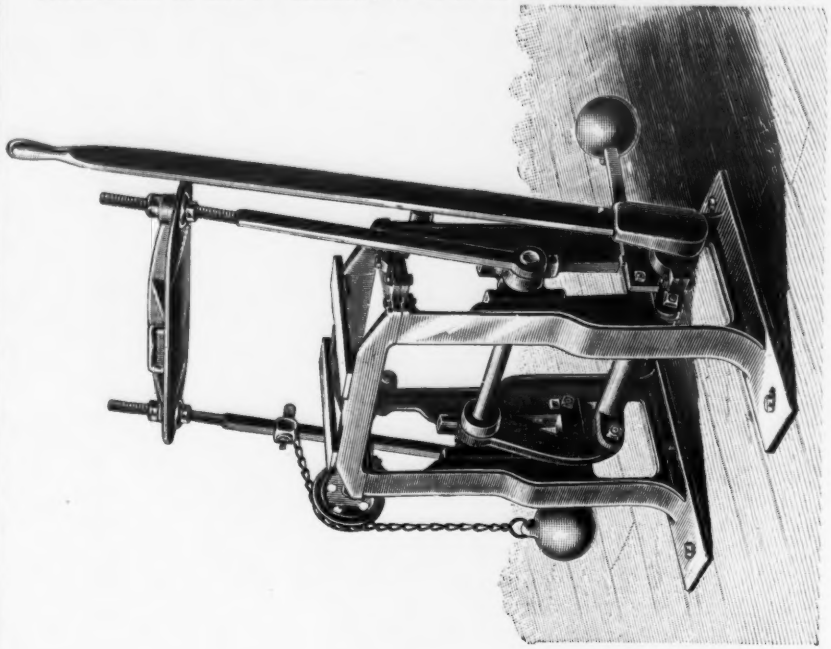

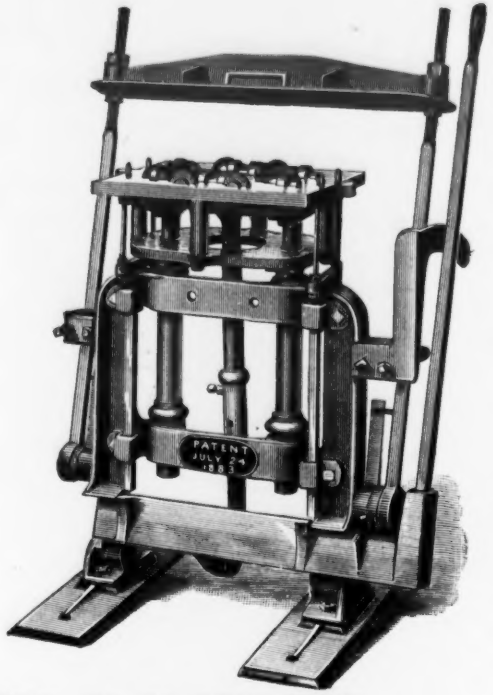

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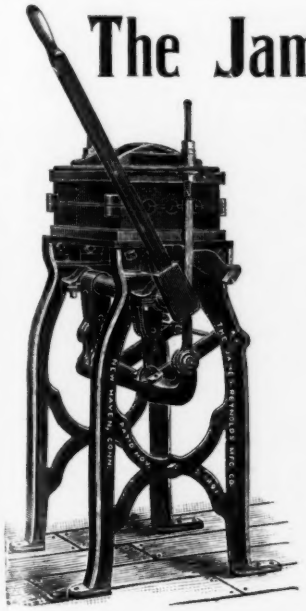

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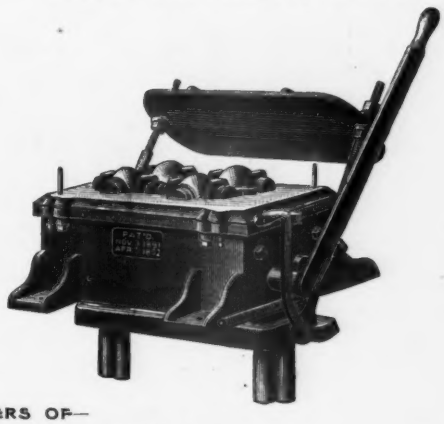

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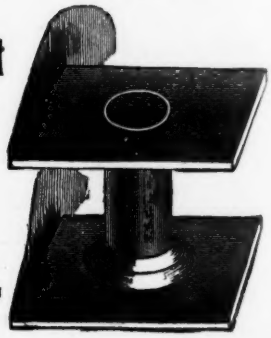

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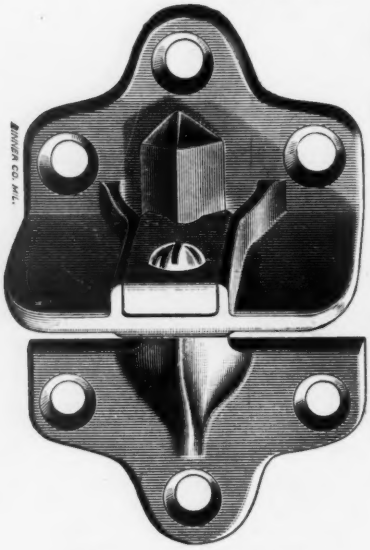

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Flask Clamps
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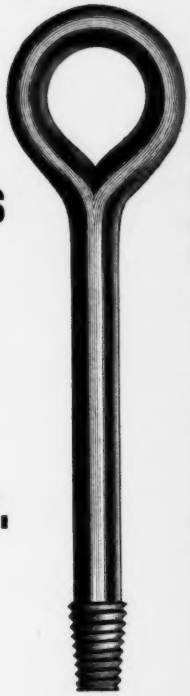

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